PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-319149

(43)Date of publication of application : 15.11.1994

(51)Int.Cl. H04N 9/64

(21)Application number : 05-274598

(22)Date of filing : 02.11.1993

(71)Applicant : OLYMPUS OPTICAL CO LTD

(72)Inventor : WADA TORU

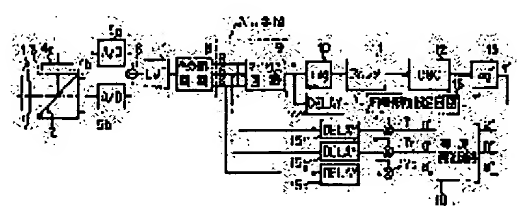
(30)Priority

Priority number : 05 52527 Priority date : 12.03.1993 Priority country : JP

(54) PICTURE PROCESSING UNIT

(57)Abstract:

PURPOSE: To attain excellent color picture display by setting a coefficient for saturation correction optimizingly to individual picture data when a dynamic range of a picture is compressed so as to prevent decrease in the saturation of a bright part of the picture and so as to suppress emphasis of apparent saturation of a dark part even when saturation is corrected while a compression ratio is being increased.



CONSTITUTION: A picture signal converted linearly by an LUT 7 is separated into each color signal by a color separation circuit 8. A luminance signal Y is extracted from each color signal by a matrix circuit 9 and a luminance signal Y' whose dynamic range is compressed is obtained by a logarithmic transformation circuit 10 via an inverse logarithmic transformation circuit 13. Then a compression coefficient Y'/Y is obtained by a compression coefficient setting circuit 16, the compression coefficient C is multiplied by each color signal by multipliers 17r-17b, and a color signal whose dynamic range is compressed is obtained while preserving the chromaticity and the color signals are corrected at a saturation correction circuit 18 in which only the saturation is suppressed without changing the luminance Y'.

LEGAL STATUS

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to the image processing system which amends saturation accommodative using the information acquired from image data about an image processing system.
[0002]
[Description of the Prior Art] Generally, the dynamic range of 50-60dB and TV (television) monitor of the dynamic range of an image sensor is about 45dB. On the other hand, the dynamic range of a common photographic subject is larger than these, and also amounts to 80-100dB. As a means to solve this, there is a technical means which is indicated by this people **** JP,63-232591,A.
[0003] According to this JP,63-232591,A, after adding the output of the color image sensor of a pair for every color, logarithmic compression only of the luminance signal acquired by matrix conversion is carried out in a logarithmic-compression circuit, and this logarithmic-compression circuit is outputted, and without changing a chromaticity because gain control etc. multiplies each chrominance signal by the ratio with the original luminance signal, a dynamic range is compressed and it is displaying on the monitor.
[0004]
[Problem(s) to be Solved by the Invention] By the way, in case an image is displayed using the technical means indicated by JP,63-232591,A, when compressibility of a dynamic range is enlarged, although the chromaticity of image data is not changing, it seems to have emphasized the saturation of an image and actually has the problem of becoming an unnatural display.
[0005] Especially, in the dark part in an image, this phenomenon appears notably. Therefore, when saturation was simply adjusted about the whole image and saturation adjustment of the dark part was carried out so that it might become a natural color tone, it was that from which the saturation of a bright part falls too much.
[0006] Without dropping the saturation of the bright part of an image, even if it performs saturation amendment, when it is made in view of the above-mentioned technical problem and compressibility is gathered, this invention suppresses emphasis of the saturation of the appearance of a dark part, and aims at offering the image processing system which can display a good color picture.
[0007]
[Means for Solving the Problem] Namely, an input means to input a picture signal including the signal which this invention requires for a color, A dynamic range compression means to compress the dynamic range of the luminance signal in the picture signal acquired from this input means, A compression coefficient setting means to ask for the relation between the output of this dynamic range compression means, and the luminance signal of the origin obtained from the above-mentioned input means, It is characterized by providing the operation means for calculating the output of this compression coefficient setting means, and the signal which starts a color from the above-mentioned input means, and a saturation amendment means to amend the saturation of the signal which starts the above-mentioned color from the above-mentioned input means.
[0008] Moreover, an input means to input a picture signal including the signal which this invention requires for a color, A dynamic range compression means to compress the dynamic range of the luminance signal in the picture signal acquired from this input means, A compression coefficient setting means to ask for the relation between the output of this dynamic range compression means, and the luminance signal of the origin obtained from the above-mentioned input means, It is characterized by providing the operation means for calculating the signal concerning the color obtained from the multiplier conversion means for changing the output of this compression coefficient setting means into the multiplier containing a saturation correction factor, and the

output of this multiplier conversion means and the above-mentioned input means.
[0009] Furthermore, this invention is characterized by to provide the subtraction means which subtracts the luminance signal acquired from each color from the matrix circuit which outputs a luminance signal, and this matrix circuit from each above-mentioned chrominance signal, a dynamic range compression means compress the dynamic range of the luminance signal acquired from the above-mentioned matrix circuit, and an addition means add the output of this dynamic range compression means to each output of the above-mentioned subtraction means.
[0010]
[Function] If it is in the image processing system of this invention, a picture signal including the signal which starts a color with an input means is inputted, and the dynamic range of the luminance signal in the picture signal acquired from this input means is compressed with a dynamic range compression means. The relation between the output of this dynamic range compression means and the luminance signal of the origin obtained from the above-mentioned input means is called for with a compression coefficient setting means, and the output of this compression coefficient setting means and the signal which starts a color from the above-mentioned input means calculate it with an operation means. And in a saturation amendment means, the saturation of the signal which starts the above-mentioned color from the above-mentioned input means is amended. Thereby, in case the dynamic range of an image is compressed, the multiplier of saturation amendment is set up the optimal to each image data. Therefore, it can display in a natural and good color tone, without the saturation of appearance becoming large too much.
[0011] Moreover, in the image processing system of this invention, an input of a picture signal including the signal which starts a color with an input means compresses the dynamic range of the luminance signal in the picture signal acquired from this input means with a dynamic range compression means. And the relation between the output of this dynamic range compression means and the luminance signal of the origin obtained from the above-mentioned input means is called for with a compression coefficient setting means. The output of this compression coefficient setting means is changed into the multiplier which contains a saturation correction factor with a multiplier conversion means. Then, in an operation means, the output of a multiplier conversion means and the signal concerning the color obtained from the above-mentioned input means calculate.
[0012] Furthermore, in this invention, a luminance signal is outputted to a matrix circuit from each color. Then, the luminance signal acquired from this matrix circuit is subtracted from each above-mentioned chrominance signal in a subtraction means. And the output into which the dynamic range of the luminance signal acquired from the above-mentioned matrix circuit was compressed into with the dynamic range compression means, and was compressed here is added to each output of the above-mentioned subtraction means with an addition means.
[0013]
[Example] Hereafter, with reference to a drawing, the example of the image processing system of this invention is explained. First, the 1st example of this invention is explained with reference to drawing 1 thru/or drawing 3 . Drawing 1 is a block diagram for explaining the configuration of this 1st example. The half mirror 2 which an image processing system is [half mirror] on the optical axis of the photography optical system 1 and this photography optical system 1, and branches an optical path in this drawing, The optical (ND) filter 3 which it was formed [filter] of the above-mentioned photography optical system 1, and while branched [filter] with the half mirror 2, and attenuates the quantity of light of optical information, Image sensor 4a which changes into an analog electrical signal the optical information which passed this light filter 3, Image sensor 4b which changes into an analog electrical signal another [which branched with the half mirror 2] optical information, image sensors 4a and 4b -- with A/D converters 5a and 5b which change each output into a digital signal The adder 6 adding the output of A/D converters 5a and 5b, and the look-up table 7 for amending to linearity the nonlinear input-output behavioral characteristics of the signal added with this adder 6 (it outlines Following LUT), It has composition with the color separation circuit 8 which divides the amended signal into each chrominance signal.
[0014] Moreover, this image processing system is equipped with the matrix circuit 9 which makes a luminance signal from each output of the color-separation circuit 8, the logarithmic-transformation circuit 10 which carries out logarithmic transformation of the acquired luminance signal, the filter 11 which controls the low-frequency component of the signal by which logarithmic transformation was carried out, the dynamic range of the output of this filter 11 and the dynamic range gain-control circuit (it is written as a DGC circuit below) 12 which

adjusts gain, and the inverse-logarithm conversion circuit 13 which carry out inverse-logarithm conversion of the output of the DGC circuit 12.

[0015] In addition, although it has composition which outputs a Y signal by the matrix circuit 9 in this example, an input means to input a picture signal inputting each chrominance signal of R, G, and B, and outputting each of this chrominance signal of R, G, and B (refer to drawing 1), it is good also as a configuration which inputs a signal another type and outputs Y and each chrominance signal, without being restricted to this. Moreover, as shown in the 10th example of drawing 28 mentioned later, you may be the configuration which outputs Y and each color-difference signal.

[0016] Furthermore, the delay circuit 14 for this image processing system to double the output and timing of the inverse logarithm conversion circuit 13 for the output of the above-mentioned matrix circuit 9, The compression coefficient setting circuit 16 which output Y' of the inverse logarithm conversion circuit 13 is **(ed) with the output Y of a delay circuit 14, and is outputted as a compression coefficient C, The delay circuits 15r, 15g, and 15b for doubling the timing of each color output of the above-mentioned color separation circuit 8, and the output of the compression coefficient setting circuit 16, Output R' of the multipliers 17r, 17g, and 17b for multiplying the output of each delay circuits 15r, 15g, and 15b by the output C of the above-mentioned compression coefficient setting circuit 16 and Multipliers 17r, 17g, and 17b, G', and B' are consisted of by the saturation amendment circuit 18 which carries out saturation amendment.

[0017] Drawing 2 is the block diagram having shown the detail of the above-mentioned saturation amendment circuit 18. The saturation amendment circuit 18 is constituted from each chrominance-signal R' after compression, G', and B' by the matrix circuit 181 for obtaining luminance-signal component Y', LUT182 which outputs the multiplier for saturation amendment according to the acquired luminance signal, an arithmetic circuit 183, Multipliers 184r, 184g, and 184b, a multiplier 185, and Adders 186r, 186g, and 186b.

[0018] The above-mentioned multipliers 184r, 184g, and 184b are for multiplying by the saturation correction factor Sc outputted to each chrominance-signal R' after compression, G', and B' from LUT182. Moreover, the above-mentioned arithmetic circuit 183 is for calculating (1-Sc) from the saturation correction factor Sc outputted from the above LUT 182. And the above-mentioned multiplier 185 multiplies output Y' of the matrix circuit 181 by the output (1-Sc) of an arithmetic circuit 183. Adders 186r, 186g, and 186b are for applying the output of this multiplier 185, and each output of the above-mentioned multipliers 184r, 184g, and 184b.

[0019] Next, actuation of this example is explained with reference to drawing 1 . The photographic subject image which passed along the photography optical system 1 is divided into a 2-way by the half mirror 2. Among those, after passing ND filter 3, image formation of one side is carried out to image sensor 4a, and it is outputted as an analog signal, and is changed into a digital signal by A/D-converter 5a. Moreover, another [which was divided by the half mirror 2] photographic subject image is changed into a digital signal by A/D-converter 5b through image sensor 4b.

[0020] Although the dark part of the photographic subject from A/D-converter5a is crushed at this time, the picture signal picturized good [without saturating a bright part] is outputted. On the other hand, although the part bright from A/D-converter5b is saturated, the picture signal picturized good [without crushing a dark part] is acquired. If these picture signals are added with an adder 6, the picture signal which has information from the dark part to the bright part will be acquired. Since input-output behavioral characteristics are not linearity, this picture signal is changed into linearity by LUT7.

[0021] The picture signal changed into linearity by LUT7 is divided into each chrominance signal of R, G, and B in the color separation circuit 8. And a luminance signal Y is taken out from each chrominance signal of R, G, and B in the matrix circuit 9, and luminance-signal Y' into which the dynamic range was compressed is obtained through the logarithmic transformation circuit 10, a filter 11, the DGC circuit 12, and the inverse logarithm conversion circuit 13. In addition, about dynamic range compression of a luminance signal, since JP,63-232591,A mentioned above has detailed description, it omits here.

[0022] In the compression coefficient setting circuit 16, compression coefficient C=Y'/Y is called for from the luminance signal Y which was able to double timing with output Y' of the inverse logarithm conversion circuit 13 by the delay circuit 14. Chrominance signals R, G, and B (timing doubles in delay circuits 15r, 15g, and 15b) can be multiplied by this compression coefficient C with Multipliers 17r, 17g, and 17b, and chrominance-signal R' into which the dynamic range was compressed while the chromaticity had been saved, G', and B' are obtained. These chrominance-signals R', G', and B' have saturation amended in the saturation amendment circuit 18, and G-" B " is obtained R " of signals.

[0023] Next, actuation of the saturation amendment circuit 18 which is a part for the principal part of this example is explained with reference to drawing 2 . Luminance-signal component Y' is taken out first in the matrix circuit 181, and signal R' inputted into the saturation amendment circuit 18, G', and B' are inputted into LUT182. Each chrominance-signal R', G', and B' can be multiplied by the output Sc of LUT182 with Multipliers 184r, 184g, and 184b. In an arithmetic circuit 183, Sc is considered as an input and (1-Sc) is outputted. With and the multiplier 185 The output (1-Sc) of an arithmetic circuit 183 can take advantaging of luminance-signal Y', and in Adders 186r, 186g, and 186b, the output is added with the output of Multipliers 184r, 184g, and 184b, and is outputted as B" G " R ".

[0024] Each chrominance signal is as follows.

R"=ScxR'+(1-Sc) xY' -- (1) G"=ScxG'+(1-Sc) xY' -- (2) B"=ScxB'+(1-Sc) xY' -- (3) Thereby, only saturation can be stopped, without changing brightness Y'.

[0025] This saturation is stopped so low that the output Sc of LUT182 is small, and becomes so high that it becomes large. Moreover, the saturation correction factor Sc becomes an achromatic color by Sc=0, and the original saturation is saved by Sc=1.

[0026] By the way, in the input-output behavioral characteristics of LUT182, as are shown in drawing 3 (a), the output is the function of the increment in monotone to the input. Therefore, the saturation of a dark part is controlled more strongly.

[0027] Since according to this example saturation control becomes strong, without dropping saturation on a high brightness part, without changing the brightness of the outputted picture signal as it becomes low brightness, even if it gathers the compressibility of a dynamic range, a good color picture without sensibility that the saturation of the low brightness section was emphasized can be obtained.

[0028] In addition, although the input-output behavioral characteristics of LUT182 were made into the primary function by drawing 3 (a), they can use various properties as shown, for example in drawing 3 (b), without being limited to this, if it is an increasing function.

[0029] Moreover, although considered as the configuration which made only R', G', and B' the input signal in drawing 2 , it is not restricted to this. For example, if the output of the inverse logarithm conversion circuit 13 shown by drawing 1 in luminance-signal Y' is used as it is, the matrix circuit 181 becomes unnecessary and can be considered as a easier configuration.

[0030] Next, the 2nd example of this invention is explained. Drawing 4 is the block diagram showing the example of a configuration from which the saturation amendment circuit of drawing 1 differs. In addition, in the example described below, since the configuration to the photography optical system 1 - the color separation circuit 8 is the same, the explanation or explanation, and illustration are omitted, about the part which carries out the same work as drawing 1 , the same reference number is attached and explanation is omitted.

[0031] Although the image processing system of this drawing 4 is almost the same as the processing section of drawing 1 , the configurations of saturation amendment circuit 18b differ, and it differs in that the output of the inverse logarithm conversion circuit 13 was added to the input of saturation amendment circuit 18b in connection with it.

[0032] Drawing 5 is the block diagram showing the configuration of saturation amendment circuit 18b used for this 2nd example. That the matrix circuit 181 and the arithmetic circuit 183 were lost, and LUT187 is added differs from the saturation amendment circuit 18 of drawing 2 . And output Y' of the inverse logarithm conversion circuit 13 is inputted into LUT182, LUT187, and a multiplier 185. Moreover, the output of LUT187 is supplied to this multiplier 185.

[0033] Next, actuation of saturation amendment circuit 18b used for this 2nd example is explained. It is inputted into saturation amendment circuit 18b, and compressed luminance-signal Y' is inputted into LUT182 and LUT187. Each chrominance-signal R', G', and B' can be multiplied by the output Sc of LUT182 with Multipliers 184r, 184g, and 184b. On the other hand, (1-Sc) is outputted in LUT187. And with a multiplier 185, the output (1-Sc) of LUT187 takes the advantage of luminance-signal Y', and with Adders 186r, 186g, and 186b, the output is applied to the output of Multipliers 184r, 184g, and 184b, and is outputted as B" G " R ".

[0034] In the input-output behavioral characteristics of LUT182, as are shown in drawing 3 (a), the output Sc is the function of the increment in monotone to input Y'. On the other hand, as shown in drawing 6 , the input-output behavioral characteristics of LUT187 are set up so that an output may serve as (1-Sc) to input Y'.

[0035] According to this 2nd example, a matrix circuit and an arithmetic circuit can be omitted in a saturation amendment circuit, and amendment of accommodative saturation is attained by easier circuitry. Next, the 3rd

example of this invention is explained.
[0036] Drawing 7 is the block diagram showing the 3rd example from which the configuration of a saturation amendment circuit differs. This 3rd example can be replaced with saturation amendment circuit 18b of drawing 4 , and is a modification of the circuit of drawing 5 . The part which added LUT188 which replaces with LUT187 which had acquired the signal from the inverse logarithm conversion circuit 13, and acquires a signal from LUT182 differs from drawing 5 . In addition, the reference number same about the part which carries out the same work is attached, and explanation is omitted.
[0037] Actuation of the 3rd example is explained with reference to drawing 7 . Luminance-signal Y' is inputted into LUT182. While each chrominance-signal R', G', and B' can be multiplied by the output Sc of LUT182 with Multipliers 184r, 184g, and 184b, it is inputted into LUT188. this LUT188 -- Input Sc -- receiving (1-Sc) -- it is outputted. And the output (1-Sc) of LUT188 can take advantaging of luminance-signal Y' with a multiplier 185. In Adders 186r, 186g, and 186b, the output is applied to the output of Multipliers 184r, 184g, and 184b, and is outputted as B" G " R ".
[0038] In the input-output behavioral characteristics of LUT182, as are shown in drawing 3 (a), the output Sc is the function of the increment in monotone to input Y'. On the other hand, as shown in drawing 8 , the input-output behavioral characteristics of LUT188 are set up so that an output may serve as (1-Sc) to Input Sc.
[0039] According to this 3rd example, in a saturation amendment circuit, can omit a matrix circuit and an arithmetic circuit, amendment of accommodative saturation is attained by easier circuitry, and a good color picture can be obtained.
[0040] Next, the 4th example changed according to the degree of compression of the correction factor of saturation of the dynamic range of an image is explained with reference to drawing 9 thru/or drawing 11 . Drawing 9 is a block diagram for explaining the configuration of the 4th example. The matrix circuit 9 where an image processing system makes a luminance signal from each signal of R, G, and B in this drawing, The logarithmic transformation circuit 10, a filter 11, and the dynamic range of the output of this filter 11 and DGC circuit 12a which adjusts gain, The inverse logarithm conversion circuit 13 which carries out inverse logarithm conversion of the output of DGC circuit 12a, and a delay circuit 14, Delay circuits 15r, 15g, and 15b and the compression coefficient setting circuit 16 which output Y' of the inverse logarithm conversion circuit 13 is ** (ed) with the output Y of a delay circuit 14, and is outputted as a compression coefficient C, Output R' of Multipliers 17r, 17g, and 17b and these multipliers 17r, 17g, and 17b, G', and B' are consisted of by the saturation amendment circuit 23 which carries out saturation amendment.
[0041] The above-mentioned DGC circuit 12a consists of adders 124 for adding output logbeta of the dynamic range (DR) multiplier setting circuit 121, the multiplier 122 for multiplying the output of a filter 11 by the output alpha of DR multiplier setting circuit 121, the gain factor setting circuit 123, and a gain factor setting circuit to the output of a multiplier 122.
[0042] Moreover, the saturation amendment circuit 23 considers the output alpha of DR multiplier setting circuit 121 in output R' of Multipliers 17r, 17g, and 17b, G', B', output Y' of the inverse logarithm conversion circuit 13, and DGC circuit 12a as the input.
[0043] Drawing 10 shows the detailed configuration of the saturation amendment circuit 23. The correction factor setting circuit 231 where this saturation amendment circuit 23 outputs the multiplier Sc for saturation amendment according to the dynamic range multiplier alpha, the saturation correction factor Sc -- an input -- carrying out (1-Sc) -- with the arithmetic circuit 232 to output The multipliers 233r, 233g, and 233b for multiplying by the saturation correction factor Sc outputted to each chrominance-signal R' after compression, G', and B' from the correction factor setting circuit 231, It consists of a multiplier 234 for multiplying output Y' of the above-mentioned inverse logarithm circuit 13 by the output (1-Sc) of an arithmetic circuit 232, and adders 235r, 235g, and 235b for applying the output of a multiplier 234 to each output of the above-mentioned multipliers 233r, 233g, and 233b.
[0044] Next, an operation of each part is explained. A luminance signal Y is taken out from each chrominance signal of R, G, and B in the matrix circuit 9, and the logarithmic transformation circuit 10, a filter 11, DGC circuit 12a, and luminance-signal Y' into which the dynamic range was compressed through the inverse logarithm conversion circuit 13 are obtained. Luminance-signal Y' compressed since logbeta was added by DGC circuit 12a here after multiplying by alpha is Yf about the output of a filter 11. When it carries out, it is expressed like (4) types.
[0045]

[Equation 1]

$$Y' = \log^{-1}(\alpha \log Y_f + \log \beta)$$
$$= \log^{-1}(\log \beta Y_f{}^{\alpha})$$
$$= \beta Y_f{}^{\alpha} \quad \cdots (4)$$

Here, alpha is the numeric value of 0-1. Therefore, the compressibility of a dynamic range becomes high, so that the dynamic range multiplier alpha is small. It is necessary to apply amendment of saturation more strongly, so that the compressibility of a dynamic range becomes high.

[0046] From the luminance signal Y with which timing was able to be doubled by output Y' of the inverse logarithm conversion circuit 13, and the delay circuit 14, compression coefficient C=Y'/Y is called for in the compression coefficient setting circuit 16. Chrominance signals R, G, and B (timing is doubled in delay circuits 15r, 15g, and 15b) can be multiplied by the compression coefficient C with Multipliers 17r, 17g, and 17b, and chrominance-signal R' into which the dynamic range was compressed while the chromaticity had been saved, G', and B' are obtained. These have saturation amended in the saturation amendment circuit 23, and G-" B " is obtained R " of signals.

[0047] Next, actuation of the saturation amendment circuit 23 which is a part for the principal part of this example is explained with reference to drawing 10 . The dynamic range multiplier alpha of DR multiplier setting circuit 121 is inputted into the correction factor setting circuit 231. In this correction factor setting circuit 231, the saturation correction factor Sc is outputted according to input-output behavioral characteristics as shown in drawing 11 . That is, the magnitude of Sc changes as alpha changes.

[0048] Each chrominance-signal R', G', and B' can be multiplied by the output Sc of the above-mentioned correction factor setting circuit 231 with Multipliers 233r, 233g, and 233b. in an arithmetic circuit 232, Sc considers as an input -- having (1-Sc) -- it is outputted. And the output (1-Sc) of an arithmetic circuit 232 can take advantaging of luminance-signal Y' with a multiplier 234. Then, the output is applied to the output of Multipliers 233r, 233g, and 233b with Adders 235r, 235g, and 235b, and G-" R " is outputted as B."

[0049] Thereby, only saturation can be stopped, without changing brightness Y'. Saturation is low stopped, so that the output Sc of the above-mentioned correction factor setting circuit 231 is small, and saturation becomes high, so that it becomes large. Moreover, the saturation correction factor Sc becomes an achromatic color by Sc=0, and the original saturation is saved by Sc=1.

[0050] Therefore, when the compressibility of a dynamic range is high, in order to control saturation more, alpha needs to make the saturation correction factor Sc a small value, when small. By the way, since in the input-output behavioral characteristics of the correction factor setting circuit 231 the output Sc is the function of the increment in monotone to Input alpha as are shown in drawing 11 , when the compressibility of a dynamic range is high, namely, if alpha becomes small, Sc will also become small and, as a result, saturation control will become strong.

[0051] Since according to this 4th example saturation control becomes strong, without dropping saturation, without changing the brightness of the outputted picture signal as compressibility becomes high when compressibility is not high, the display of a better color picture is attained.

[0052] In addition, although the input-output behavioral characteristics of the correction factor setting circuit 231 were made into the primary function by drawing 11 , various properties can be used for them, without being limited to this, if it is an increasing function.

[0053] Next, the 5th example of this invention is explained with reference to drawing 12 thru/or drawing 14 . This 5th example is changed according to the degree of compression of the correction factor of saturation of the dynamic range of an image.

[0054] Drawing 12 is a block diagram for explaining the configuration of the 5th example. This image processing system The matrix circuit 9, the logarithmic transformation circuit 10, and a filter 11, DGC circuit 12a, the inverse logarithm conversion circuit 13, a delay circuit 14, and delay circuits 15r, 15g, and 15b, Output R' of the compression coefficient setting circuit 16, Multipliers 17r, 17g, and 17b, and these multipliers 17r, 17g, and 17b, G', and B' are consisted of by the saturation amendment circuit 19 which carries out saturation amendment.

[0055] DGC circuit 12a consists of DR multiplier setting circuit 121, a multiplier 122, a gain factor setting

circuit 123, and an adder 124. The saturation amendment circuit 19 considers the output alpha of DR multiplier setting circuit 121 in output R' of Multipliers 17r, 17g, and 17b, G', B', output Y' of the inverse logarithm conversion circuit 13, and DGC circuit 12a as the input.

[0056] Drawing 13 shows the detailed configuration of the saturation amendment circuit 19. The correction factor setting circuit 191 where the saturation amendment circuit 19 outputs the multiplier Sc for saturation amendment according to luminance-signal Y', the saturation correction factor Sc -- an input -- carrying out (1-Sc) -- with the arithmetic circuit 192 to output The multipliers 193r, 193g, and 193b for multiplying by the saturation correction factor Sc outputted to each chrominance-signal R' after compression, G', and B' from the correction factor setting circuit 191, It has composition with the multiplier 194 for multiplying output Y' of the above-mentioned matrix circuit 9 by the output (1-Sc) of an arithmetic circuit 232, and the adders 195r, 195g, and 195b for applying the output of a multiplier 194 to each output of the above-mentioned multipliers 193r, 193g, and 193b.

[0057] Next, an operation of each part is explained. A luminance signal Y is taken out in the matrix circuit 9, and the logarithmic transformation circuit 10, a filter 11, DGC circuit 12a, and luminance-signal Y' into which the dynamic range was compressed through the inverse logarithm conversion circuit 13 are obtained from each chrominance signal of R, G, and B. Luminance-signal Y' compressed since logbeta was added by DGC circuit 12a here after alpha was able to take advantaging is Yf about the output of a filter 11. It is expressed with the above-mentioned (4) formula when it carries out.

[0058] Here, in the above-mentioned (4) formula, alpha is the numeric value of 0-1. Therefore, the compressibility of a dynamic range becomes high, so that the dynamic range multiplier alpha is small. Moreover, it is necessary to apply amendment of saturation more strongly, so that the compressibility of a dynamic range becomes high.

[0059] Compression coefficient C=Y'/Y is called for in the compression coefficient setting circuit 16 from the luminance signal Y which was able to double timing with output Y' of the inverse logarithm conversion circuit 13 by the delay circuit 14. Chrominance signals R, G, and B (timing is doubled in delay circuits 15r, 15g, and 15b) can be multiplied by the compression coefficient C with Multipliers 17r, 17g, and 17b, and chrominance-signal R' into which the dynamic range was compressed while the chromaticity had been saved, G', and B' are obtained. And these have saturation amended in the saturation amendment circuit 19, and G-" B " is obtained R " of signals.

[0060] Next, actuation of the saturation amendment circuit 19 which is a part for the principal part of this example is explained with reference to drawing 13 and drawing 14 . Luminance-signal Y' and the dynamic range multiplier alpha are inputted into the correction factor setting circuit 191. In the correction factor setting circuit 191, the saturation correction factor Sc is computed according to following the (5) type.

Sc=(1-alpha) xY'+alpha -- (5) This serves as input-output behavioral characteristics as shown in drawing 14 . The magnitude of Sc changes as alpha changes.

[0061] And each chrominance-signal R', G', and B' can be multiplied by the output Sc of the correction factor setting circuit 191 with Multipliers 193r, 193g, and 193b. In the above-mentioned arithmetic circuit 192, (1-Sc) is outputted by considering Sc as an input. Then, with a multiplier 194, the output (1-Sc) of an arithmetic circuit 192 can take advantaging of luminance-signal Y', and the output is applied to the output of Multipliers 193r, 193g, and 193b with Adders 195r, 195g, and 195b. In this way, G-" R " is outputted as B."

[0062] Thereby, only saturation can be stopped, without changing brightness Y'. Therefore, saturation is low stopped, so that the output Sc of the correction factor setting circuit 191 is small, and saturation becomes high, so that it becomes large. The saturation correction factor Sc becomes an achromatic color by Sc=0, and the saturation that Sc=1 is is saved.

[0063] Therefore, when the compressibility of a dynamic range is high, in order to control the saturation of a dark part more, a luminance signal is more small, and alpha needs to make the saturation correction factor Sc a small value, when small.

[0064] By the way, in the input-output behavioral characteristics of the correction factor setting circuit 191, as are shown in drawing 14 , the output is the function of the increment in monotone to the input. For this reason, the saturation of a dark part is controlled more strongly. Moreover, since the value of Sc at the time of an input 0 is equal to the dynamic range multiplier alpha, when the compressibility of a dynamic range is high, namely, if alpha becomes small, over an input at large, Sc will also become small and, as a result, saturation control will become strong over an input at large.

[0065] Thus, since according to the 5th example saturation control becomes strong, without dropping saturation on a high brightness part, without changing the brightness of the outputted picture signal as it becomes low brightness, even if it gathers the compressibility of a dynamic range, sensibility that the saturation of the low brightness section was emphasized is not produced. Moreover, since control of saturation can weaken on the whole when seldom gathering compressibility, the display of a better color picture is attained.
[0066] In addition, although the input-output behavioral characteristics of the correction factor setting circuit 191 were made into the primary function by drawing 14 , various properties can be used for them, without being limited to this, if it is an increasing function.
[0067] Moreover, although the value of Sc at the time of an input 0 was made equal to the dynamic range multiplier alpha in this example, it is good also as a function which is proportional to alpha about this, and good also as a high order function of alpha.
[0068] Next, the 6th example which does not use a correction factor setting circuit is explained with reference to drawing 15 and drawing 16 . In addition, this example can be replaced with the saturation amendment circuit 19 of drawing 12 , and is a modification of drawing 13 .
[0069] The configuration of the 6th example is explained with reference to drawing 15 . Luminance-signal Y' is inputted into LUTs 196a, 196b, 196c, 196d, and 196e. The output of LUTs 196a-196e turns into an input of a selection circuitry 197. And in this selection circuitry 197, the output of LUTs 196a-196e is switched according to the value of alpha, using the dynamic range multiplier alpha as a selection signal. Thereby, the output of LUTs 196a-196e can take advantaging of each chrominance-signal R', G', and B' with Multipliers 193r, 193g, and 193b.
[0070] Moreover, the output Sc of the above-mentioned selection circuitry 197 is inputted into coincidence in an arithmetic circuit 192. this arithmetic circuit 192 -- Input Sc -- receiving (1-Sc) -- it is outputted. Furthermore, with a multiplier 194, the output (1-Sc) of an arithmetic circuit 192 can take advantaging of luminance-signal Y', the output is applied to the output of Multipliers 193r, 193g, and 193b with Adders 195r, 195g, and 195b, and G-" R " is outputted as B."
[0071] Drawing 16 shows the input-output behavioral characteristics of LUTs 196a, 196b, 196c, 196d, and 196e. In drawing 16 , LUTs 196d and 35 support [the property of 31 in drawing / LUTs 196a and 32 / LUTs 196b and 33 / LUTs 196c and 34] LUT196e. According to this, saturation control has strongest LUT196a and it turns out that it becomes weak in order of Following 196b, 196c, 196d, and LUTs 196e.
[0072] Moreover, when the value of alpha is small, he is trying to choose weak LUT of alpha's saturation control of strong LUT of saturation control when large in a selection circuitry 197, when the compressibility of a dynamic range is high.
[0073] Therefore, since according to the 6th example saturation control becomes strong, without dropping saturation on a high brightness part, without changing the brightness of the outputted picture signal as it becomes low brightness, even if it gathers the compressibility of a dynamic range, sensibility that the saturation of the low brightness section was emphasized is not produced. Moreover, since control of saturation can weaken on the whole when compressibility is not high, the display of a better color picture is attained.
[0074] In addition, the arithmetic circuit 192 of drawing 15 can be transposed to LUT198, as shown in drawing 17 . Next, the 7th example of this invention is explained.
[0075] Drawing 18 shows the block diagram of the saturation amendment circuit where configurations differ. Although this drawing 18 is the modification of drawing 5 and is almost the same as drawing 5 , the configurations of the saturation amendment circuit 20 differ and it differs in that the output Y of a delay circuit 14 was added to the input of the saturation amendment circuit 20 in connection with it. The reference number same about the part which carries out the same work as other drawing 5 is attached, and explanation is omitted.
[0076] The saturation amendment circuit 20 used for this 7th example is explained with reference to drawing 19 . The luminance signal Y inputted into the saturation amendment circuit 20 before being compressed is inputted into LUT201. Each chrominance-signal R', G', and B' can be multiplied by the output Sc of this LUT201 with Multipliers 204r, 204g, and 204b. In an arithmetic circuit 202, (1-Sc) is outputted by considering the output Sc of the above LUT 201 as an input. Moreover, in a multiplier 203, the output (1-Sc) of an arithmetic circuit 202 can take advantaging of compressed luminance-signal Y'. And it is added to the output of Multipliers 204r, 204g, and 204b with Adders 205r, 205g, and 205b, and G-" R " is outputted to the output as B."
[0077] In the input-output behavioral characteristics of LUT201, as are shown in drawing 20 , the output Sc is

the function of the increment in monotone to the input. When the dynamic range of an input is large, to the maximum of data, even the data of a smaller value exist and compressibility must be made high. On the other hand, when a dynamic range is narrow, the data below a certain value do not exist, but make compressibility low. On the other hand, it will be called a part with the small value of an input with a dark part, i.e., compression before, when compressibility is high. Therefore, if the saturation correction factor Sc is set up to the luminance signal Y before compression as shown in drawing 20 , when compressibility is high, the saturation of a dark part can be stopped.
[0078] Thus, according to the 7th example, the multiplier of saturation amendment can be determined without being based on compressibility, and amendment of accommodative saturation can be realized by easy circuitry, without preparing a complicated multiplier setting circuit etc.
[0079] In addition, in this example, although the input-output behavioral characteristics of LUT201 were made into the primary function, this may be used for a higher order function, an exponential function, a logarithmic function, etc. Moreover, it cannot be overemphasized that an arithmetic circuit 202 may be constituted using LUT.
[0080] Drawing 21 is the block diagram having shown the 8th example of the saturation amendment circuit where configurations differ. This 8th example is a modification of drawing 5 , and except that it differs from the configuration of the saturation amendment circuit 21 in that output C=Y'/Y of the compression coefficient setting circuit 16 was added to the input of the saturation amendment circuit 21 in connection with it, it is almost the same as the configuration of drawing 5 . Therefore, the reference number same about the part which carries out the same work as drawing 5 is attached, and explanation is omitted.
[0081] Next, the saturation amendment circuit 21 used for the 8th example is explained with reference to drawing 22 . The output C of the compression coefficient setting circuit 16 inputted into the saturation amendment circuit 21 is inputted into LUT211. Each chrominance-signal R', G', and B' can be multiplied by the output Sc of this LUT211 with Multipliers 214r, 214g, and 214b. In an arithmetic circuit 212, (1-Sc) is outputted considering the output Sc of LUT211 as an input. Moreover, in a multiplier 213, the output (1-Sc) of an arithmetic circuit 212 can take advantaging of compressed luminance-signal Y', the output is applied to the output of Multipliers 214r, 214g, and 214b with Adders 215r, 215g, and 215b, and G-" R " is outputted as B."
[0082] In the input-output behavioral characteristics of LUT211, as are shown in drawing 23 , the output Sc is the function of monotone reduction to input C=Y'/Y. When the dynamic range of an input is large, to the maximum of data, even the data of a smaller value exist and compressibility must be made high. At this time, compression coefficient C=Y'/Y which is the luminance signal Y before the compression in image data with a small value and the ratio of luminance-signal Y' after compression becomes a big value, and C=Y'/Y becomes a small value about image data with a big value. On the other hand, when a dynamic range makes compressibility low narrowly, C=Y'/Y becomes a small value over an input at large.
[0083] therefore, the luminance signal Y before compression and the ratio of luminance-signal Y' after compression -- if the saturation correction factor Sc is set up to C=Y'/Y as shown in drawing 23 , when compressibility is high, the saturation of a dark part can be stopped.
[0084] According to this example, the multiplier of saturation amendment can be determined according to the compressibility of each pixel, and amendment of exact saturation can be realized. In addition, although the input-output behavioral characteristics of LUT211 were made into the primary function in this example, this may be used for a higher order function, an exponential function, a logarithmic function, etc.
[0085] Furthermore, although the arithmetic circuit 212 was used for obtaining (1-Sc) in this example, as shown, for example in drawing 24 , it is good also as a configuration using LUT216. in this case, LUT216 -- C=Y'/Y -- an input -- carrying out -- those output characteristics -- the output Sc of LUT211 -- corresponding (1-Sc) -- it is set up so that it may become. Thereby, equivalent effectiveness can be acquired.
[0086] Moreover, LUT217 may be used as shown in drawing 25 . as LUT217 considering the output Sc of LUT211 as an input, and the input-output behavioral characteristics being shown in drawing 8 -- Input Sc -- receiving (1-Sc) -- it is set up so that it may be outputted. Thereby, equivalent effectiveness can be acquired.
[0087] Next, the 9th example which simplified circuitry is explained with reference to drawing 26 and drawing 27 . Drawing 26 is a block diagram for explaining the configuration of the 9th example. In this drawing an image processing system The matrix circuit 9 and the logarithmic transformation circuit 10, A filter 11, the DGC circuit 12, the inverse logarithm conversion circuit 13, and a delay circuit 14, Delay circuits 15r, 15g, and 15b and the subtractors 221r, 221g, and 221b for subtracting the output Y of a delay circuit 14 from the output

of each delay circuits 15r, 15g, and 15b, It consists of adders 222r, 222g, and 222b which add output Y' of the above-mentioned inverse logarithm conversion circuit 13 to the output of the above-mentioned subtractors 221r, 221g, and 221b, and output it as B" G " R ".

[0088] Here, it explains, referring to the 8th drawing 21 and drawing 22 of an example which mentioned actuation of the 9th example above. If R signal is taken for an example, in drawing 21 , R will be compressed and will become R', but since the compression coefficient at this time is C=Y'/Y, R' is shown by the degree type.

R'=CxR=(Y'/Y) xR -- (6) R " of signals after saturation amendment is expressed again as follows than the above-mentioned (1) formula.

R"=ScxR'+(1-Sc) xY' -- (7) This is arranged and a degree type is obtained.

R"=Scx(Y'/Y) xR+(1-Sc) xY' -- (8) Here, as shown in drawing 27 , LUT211 of drawing 22 is set up so that it may become Sc=Y/Y', so that Sc may serve as a monotonically decreasing function of C=Y'/Y. That is, a degree type will be obtained if Sc=Y/Y' is substituted and arranged at an above-mentioned (8) ceremony.

R" -- =R+Y'-Y -- (9) others -- the same is completely said of a color.

[0089] On the other hand, according to the configuration of drawing 26 , the output as this formula is obtained. Therefore, the effectiveness completely same with having set up the input-output behavioral characteristics of LUT211 in the configuration of drawing 21 in the 8th example and drawing 22 , by the configuration of drawing 26 , as shown in drawing 27 can be acquired.

[0090] According to this 9th example, accommodative saturation amendment can be performed by very easy circuitry. Next, the 10th example of this invention is explained with reference to drawing 28 thru/or drawing 30 .

[0091] Drawing 28 is a block diagram for explaining the configuration of the 10th example of this invention. Drawing 28 is a block diagram for explaining the configuration of this 10th example. In this drawing, the image processing system has composition with the photography optical system 1, a half mirror 2, ND filter 3, image sensors 4a and 4b, A/D converters 5a and 5b, an adder 6, LUT7, and the color separation circuit 8. This image processing system is equipped with the matrix circuit 24 which makes a luminance signal and a color-difference signal, the logarithmic transformation circuit 10, a filter 11, the DGC circuit 12, the inverse logarithm conversion circuit 13, the delay circuit 14 for doubling the timing of the output of the above-mentioned matrix circuit 24, and the output of the inverse logarithm conversion circuit 13, and the compression coefficient setting circuit 16 from each output of the color separation circuit 8 again.

[0092] In addition, an input means to input a picture signal is constituted from the matrix circuit 24 by this example. Furthermore, the delay circuits 25r and 25b for this image processing system to double the timing of each color-difference-signal output of the above-mentioned matrix circuit 24, and the output of the compression coefficient setting circuit 16, The multipliers 26r and 26b for multiplying the output of each delay circuits 25r and 25b by the output C of the compression coefficient setting circuit 16, these -- a multiplier -- 26 -- r -- 26 -- b -- an output -- Cr -- ' -- Cb -- ' -- from -- saturation -- amendment -- carrying out -- having had -- a signal -- Cr -- " -- Cb -- " -- outputting -- saturation -- amendment -- a circuit -- 27 -- Output Cr" of the saturation amendment circuit 27, and the delay circuit 28 for doubling the timing of Cb" and Y', this -- a delay circuit -- 28 -- an output -- Y -- ' -- saturation -- amendment -- a circuit -- 27 -- an output -- Cr -- " -- Cb -- " -- from -- saturation -- amendment -- carrying out -- having had -- a chrominance signal -- R -- " -- G -- " -- B -- " -- outputting -- a matrix -- a circuit -- 29 -- constituting -- having -- **** .

[0093] Drawing 29 is the block diagram having shown the above-mentioned saturation amendment circuit 27 and the configuration of the circumference circuit. The saturation amendment table 271 which the saturation amendment circuit 27 considers luminance-signal component Y' after compression as an input, and outputs the multiplier for saturation amendment according to the luminance-signal Y', The delay circuit 272 for doubling timing with each color-difference-signal Cr' after compressing the saturation correction factor Sc outputted from the saturation amendment table 271, and Cb' (output of Multipliers 26r and 26b), It consists of multipliers 273r and 273b for taking advantaging of each color-difference-signal Cr' after compressing the saturation correction factor Sc outputted from a delay circuit 272, and Cb' (output of Multipliers 26r and 26b).

[0094] Next, actuation of this example is explained with reference to drawing 28 . The photographic subject image which passed along the photography optical system 1 is divided into a 2-way by the half mirror 2, and after passing ND filter 3, image formation of one side is carried out to image sensor 4a, and it is outputted as an analog signal, and is changed into a digital signal by A/D-converter 5a. Another [which was divided by the half

mirror 2] photographic subject image is changed into a digital signal by A/D-converter 5b through image sensor 4b.
[0095] Although the dark part of the photographic subject from A/D-converter5a is crushed at this time, the picture signal picturized good [without saturating a bright part] is outputted. On the other hand, although the part bright from A/D-converter5b is saturated, the picture signal picturized good [without crushing a dark part] is acquired. The picture signal which adds these with an adder 6 and which has information from the dark part to the bright part is acquired. Since input-output behavioral characteristics are not linearity, this picture signal is changed into linearity by LUT7.
[0096] It separates into each chrominance signal of R, G, and B in the color separation circuit 8, and the picture signal changed into linearity by LUT7 is changed into a luminance signal Y and color-difference signals Cr and Cb in the matrix circuit 24. The luminance signal Y outputted from the matrix circuit 24 is outputted as luminance-signal Y' into which the dynamic range was compressed through the logarithmic transformation circuit 10, a filter 11, the DGC circuit 12, and the inverse logarithm conversion circuit 13.
[0097] From the luminance signal Y with which output Y' of the inverse logarithm conversion circuit 13 and a delay circuit 14 doubled in timing, compression coefficient C=Y'/Y is called for in the compression coefficient setting circuit 16. While color-difference signals Cr and Cb (timing is doubled in delay circuits 25r and 25b) could be multiplied by the compression coefficient C with Multipliers 26r and 26b and the chromaticity had been saved, color-difference-signal Cr' into which the dynamic range was compressed, and Cb' are obtained. These color-difference-signals Cr' and Cb' have saturation amended in the saturation amendment circuit 27, and signal Cr" and Cb" are obtained.
[0098] in this way -- saturation -- amendment -- carrying out -- having had -- a color-difference signal -- Cr -- " -- Cb -- " -- a delay circuit -- 28 -- timing -- doubling -- having had -- compression -- the back -- a luminance signal -- Y -- ' -- simultaneously -- a matrix -- a circuit -- 29 -- inputting -- having -- saturation -- amendment -- carrying out -- having had -- a chrominance signal -- R -- " -- G -- " -- B -- " -- changing -- having .
[0099] Next, actuation of the saturation amendment circuit 27 which is a part for the principal part of this example is explained with reference to drawing 29 . Luminance-signal component Y' inputted into saturation amendment circuit 27a is inputted into the saturation amendment table 271. Each color-difference-signal Cr' and Cb' can be multiplied by the output Sc of the saturation amendment table 271 with Multipliers 273r and 273b.
[0100] Each color-difference signal is as follows.
Cr"=ScxCr'=ScxCxCr --(10) Cb" =ScxCb'=ScxCxCb -- (11)
The output Sc of the saturation amendment table 271 takes the value of 0-1, saturation is low stopped, so that Sc is small, and saturation becomes high, so that it becomes large. The saturation correction factor Sc becomes an achromatic color by Sc=0, and saturation with origin is saved by Sc=1.
[0101] Moreover, as shown in drawing 30 , the input-output behavioral characteristics of the saturation amendment table 271 are set up so that an output may serve as an increment in monotone to an input. Thereby, the dark re-degree of a part is controlled more strongly.
[0102] In addition, as a modification of this 10th example, as shown in drawing 31 , it constitutes, and the same effectiveness is acquired, even if it is made to perform saturation amendment before multiplying each color-difference signal by the compression coefficient C.
[0103] That is, saturation amendment circuit 27a consists of a saturation amendment table 271 and multipliers 273r and 273b. In these multipliers 273r and 273b, the output Sc of the saturation amendment table 271 takes the advantage of color-difference signals Cr and Cb from delay circuits 25r and 25b. And the output Sc which minded [color-difference-signal Cr' obtained by this and / Cb] the delay circuit 30 from the saturation amendment table 271 can take advantaging with Multipliers 26r and 26b, and becomes signal Cr" and Cb".
[0104] In addition, in this invention, it is applicable for it to be made to perform saturation amendment, before multiplying the signal concerning a color by the compression coefficient C, as shown in the modification mentioned above also to the example described below.
[0105] Thus, since according to the 10th example saturation control becomes strong, without dropping saturation on a high brightness part, without changing the brightness of the outputted picture signal as it becomes low brightness, even if it gathers the compressibility of a dynamic range, a good color picture without sensibility that the saturation of the low brightness section was emphasized is obtained.
[0106] Moreover, compared with an old example, circuitry is further simplified by using a color-difference signal. In addition, although the input-output behavioral characteristics of the saturation amendment table 271

were made into the primary function by drawing 30 , various properties can be used for them, without being limited to this, if it is an increasing function.

[0107] Next, the 11th example of this invention is explained. Drawing 32 is the block diagram showing the example of a configuration from which a saturation amendment circuit differs. Both the output C of the compression coefficient setting circuit 16 and the output Sc of the saturation amendment table 271 are connected to the input of a multiplier 274. The output of a multiplier 274 is connected to the input of Multipliers 275r and 275b. The outputs Cr and Cb of delay circuits 25r and 25b are connected to another input of Multipliers 275r and 275b, respectively. And the output of Multipliers 275r and 275b is inputted into the matrix circuit 29.

[0108] In such a configuration, it is outputted from the matrix circuit 24 and product ScxC of the output C of the compression coefficient setting circuit 16 and the output Sc of the saturation amendment table 271 can take advantaging of the color-difference signals Cr and Cb which passed through delay circuits 25r and 25b. Consequently, the output of Multipliers 275r and 275b serves as ScxCxCr and ScxCxCb, respectively. As for these, (10) and (11) types which were mentioned above show Cr" and that it is Cb".

[0109] Like the 10th example mentioned above, as shown in drawing 30 , the input-output behavioral characteristics of the saturation amendment table 271 are set up so that an output may serve as an increment in monotone to an input. Thereby, the saturation of a dark part is controlled more strongly.

[0110] In addition, although the input-output behavioral characteristics of the saturation amendment table 271 were made into the primary function by drawing 30 , various properties can be used for them, without being limited to this, if it is an increasing function.

[0111] Since according to the 11th example saturation control becomes strong, without dropping saturation on a high brightness part, without changing the brightness of the outputted picture signal as it becomes low brightness, even if it gathers the compressibility of a dynamic range, a good color picture without sensibility that the saturation of the low brightness section was emphasized is obtained.

[0112] Moreover, compared with the 10th example mentioned above, circuitry is simplified further. Next, with reference to drawing 33 and drawing 34 , the 12th example changed according to the degree of compression of the correction factor of saturation of the dynamic range of an image is explained.

[0113] Drawing 33 is the block diagram showing the configuration of the 12th example. In this drawing, the image processing system has the matrix circuit 24 which makes a luminance signal Y and color-difference signals Cr and Cb, the logarithmic transformation circuit 10, a filter 11, DGC circuit 12a, the inverse logarithm conversion circuit 13 that carries out inverse logarithm conversion of the output of DGC circuit 12a, the delay circuit 14, and the compression coefficient setting circuit 16 from each signal of R, G, and B. Moreover, this image processing system is constituted from output Cr' of delay circuits 25r and 25b, Multipliers 26r and 26b, and these multipliers 26r and 26b, and Cb' by the saturation amendment circuit 31 which carries out saturation amendment.

[0114] The above-mentioned DGC circuit 12a consists of DR multiplier setting circuit 121, the multiplier 122, the gain factor setting circuit 123, and the adder 124, as mentioned above. The saturation amendment circuit 31 consists of a saturation amendment table 311 and multipliers 312r and 312b. The above-mentioned saturation amendment circuit 31 considers the output alpha of output Cr' of Multipliers 26r and 26b, Cb', and the dynamic range multiplier setting circuit 121 in DGC circuit 12a as the input, and outputs the multiplier Sc for saturation amendment according to the dynamic range multiplier alpha. Moreover, Multipliers 312r and 312b are for multiplying by the saturation correction factor Sc outputted to each color-difference-signal Cr' after compression, and Cb' from the saturation amendment table 311.

[0115] Next, actuation of this 12th example is explained. Luminance-signal Y' into which the dynamic range was compressed in the matrix circuit 24 through drawing, the logarithmic transformation circuit 10, a filter 11, DGC circuit 12a, and the inverse logarithm conversion circuit 13 in the luminance signal Y is obtained. Here, since logbeta is added after multiplying by alpha, compressed luminance-signal Y' is expressed with DGC circuit 12a like the above-mentioned (4) types, when the output of a filter is set to Yf.

[0116] Here, alpha is the numeric value of 0-1. Therefore, the compressibility of a dynamic range becomes high, so that the dynamic range multiplier alpha is small. It is necessary to apply amendment of saturation more strongly, so that the compressibility of a dynamic range becomes high. Compression coefficient C=Y'/Y is called for in the compression coefficient setting circuit 16 from the luminance signal Y which was able to double timing with output Y' of the inverse logarithm conversion circuit 13 by the delay circuit 14. Color-

difference signals Cr and Cb (timing doubles in delay circuits 25r and 25b) can be multiplied by the compression coefficient C with Multipliers 26r and 26b, and color-difference-signal Cr' into which the dynamic range was compressed while the chromaticity had been saved, and Cb' are obtained. These have saturation amended in the saturation amendment circuit 31, and signal Cr" and Cb" are obtained.
[0117] Here, actuation of the saturation amendment circuit 31 which is a part for the principal part of this example is explained. The dynamic range multiplier alpha is inputted into the saturation amendment table 311. On the saturation amendment table 311, the saturation correction factor Sc is outputted according to input-output behavioral characteristics as shown in drawing 34 . And the magnitude of Sc changes as alpha changes. Each chrominance-signal Cr' and Cb' can be multiplied by the output Sc of the saturation amendment table 311 with Multipliers 312r and 312b, and it is outputted as Cr" and Cb".
[0118] Thereby, only saturation can be stopped, without changing brightness Y'. The output Sc of the saturation amendment table 311 takes the value of 0-1, saturation is low stopped, so that Sc is small, and saturation becomes high, so that it becomes large. Moreover, the saturation correction factor Sc becomes an achromatic color by Sc=0, and the saturation that Sc=1 is is saved. Therefore, when the compressibility of a dynamic range is high, in order to control saturation more, alpha needs to make the saturation correction factor Sc a small value, when small.
[0119] As shown in drawing 34 , the input-output behavioral characteristics of the saturation amendment table 311 are set up so that an output Sc may serve as an increment in monotone to Input alpha. Thereby, when the compressibility of a dynamic range is high, namely, if alpha becomes small, Sc will also become small and, as a result, saturation control will become strong.
[0120] In addition, although the input-output behavioral characteristics of the saturation amendment table 311 were made into the primary function by drawing 34 , various properties can be used for them, without being limited to this, if it is an increasing function.
[0121] Since according to this 12th example saturation control becomes strong according to compressibility becoming high, without dropping saturation, without changing the brightness of the outputted picture signal when compressibility is not high, the display of a better color picture is attained.
[0122] Furthermore, since a color-difference signal is used, circuitry is simplified. Next, the 13th example of this invention is explained. Drawing 35 is the block diagram having shown the configuration of the 13th example using the saturation amendment circuit where configurations differ. This is the modification of the image processing system shown in drawing 33 .
[0123] In drawing 35 , the output C of the compression coefficient setting circuit 16 and the output Sc of the saturation amendment table 311 are connected to both the inputs of a multiplier 313. The output of this multiplier 313 is connected to the input of Multipliers 314r and 314b. The outputs Cr and Cb of delay circuits 25r and 25b are connected to another input of Multipliers 314r and 314b, respectively. And the output of Multipliers 314r and 314b is inputted into the matrix circuit 29, respectively.
[0124] In such a configuration, it is outputted from the matrix circuit 24 and product ScxC of the output C of the compression coefficient setting circuit 16 and the output Sc of the saturation amendment table 311 can take advantaging of the color-difference signals Cr and Cb which passed through delay circuits 25r and 25b. Consequently, the output of Multipliers 314r and 314b serves as ScxCxCr and ScxCxCb, respectively. As for these, (10) types and (11) types which were mentioned above show Cr" and that it is Cb".
[0125] Moreover, like the 12th example mentioned above, as shown in drawing 34 , the input-output behavioral characteristics of the saturation amendment table 311 are set up so that an output may serve as an increment in monotone to an input. Thereby, when the compressibility of a dynamic range is high, namely, if alpha becomes small, Sc will also become small and, as a result, saturation control will become strong.
[0126] In addition, although the input-output behavioral characteristics of the saturation amendment table 311 were made into the primary function by drawing 34 , various properties can be used for them, without being limited to this, if it is an increasing function.
[0127] Furthermore, since according to this 13th example saturation control becomes strong, without dropping saturation, without changing the brightness of the outputted picture signal as compressibility becomes high when compressibility is not high, the display of a better color picture is attained.
[0128] Moreover, compared with the 12th example mentioned above, circuitry is simplified further. Next, the 14th example of this invention is explained. Drawing 36 is what showed the 14th example using the saturation amendment circuit where configurations differ, and there is. This is another modification of the image

processing system shown in drawing 33 . Although it is almost the same as the processing section of drawing 33 , the configurations of a saturation amendment circuit differ.
[0129] In drawing 36 , the saturation amendment circuit 32 consists of a correction factor setting circuit 321, a delay circuit 322, and multipliers 323r and 323b. The above-mentioned correction factor setting circuit 321 is for outputting a correction factor Sc from the output alpha of DR multiplier setting circuit 121, and the output Y of the inverse logarithm conversion circuit 13. Moreover, a delay circuit 322 is for doubling timing with the output Sc of the correction factor setting circuit 321 with output Cr' of Multipliers 26r and 26b, and Cb'. Furthermore, Multipliers 323r and 323b are for multiplying by output Cr' of a delay circuit 322 and Multipliers 26r and 26b, Cb', and the correction factor Sc.
[0130] Here, the configuration and actuation of the saturation amendment circuit 32 which are used for this 14th example are explained with reference to drawing 36 . Luminance-signal Y' and the dynamic range multiplier alpha are inputted into the correction factor setting circuit 321. In the correction factor setting circuit 321, the saturation correction factor Sc is computed according to (12) types.
Sc=(1-alpha) xY'+alpha -- (12) This serves as input-output behavioral characteristics as shown in drawing 37 . The magnitude of Sc changes as Y' and alpha change.
[0131] After timing is adjusted in a delay circuit 322, each color-difference-signal Cr' and Cb' can be multiplied by the output Sc of the correction factor setting circuit 321 with Multipliers 323r and 323b, and it is outputted as Cr" and Cb". The output Sc of the above-mentioned correction factor setting circuit 321 takes the value of 0-1, saturation is low stopped, so that it is small, and saturation becomes high, so that it becomes large. It becomes an achromatic color by Sc=0 and the saturation that Sc=1 is is saved.
[0132] By the way, since in the input-output behavioral characteristics of the correction factor setting circuit 321 the output is the function of the increment in monotone to the input as are shown in drawing 37 , the saturation of a dark part is controlled more strongly. Moreover, since the value of Sc is equal to the dynamic range multiplier alpha at the time of an input 0, when the compressibility of a dynamic range is high, namely, if alpha becomes small, Sc will also become small over an input at large, consequently saturation control will become strong over an input at large.
[0133] In addition, although the input-output behavioral characteristics of the correction factor setting circuit 321 were made into the primary function by drawing 37 , various properties can be used for them, without being limited to this, if it is an increasing function.
[0134] Moreover, although the value of Sc at the time of an input 0 was made equal to the dynamic range multiplier alpha in this example, it is good also as a function which is proportional to alpha about this, and good also as a high order function of alpha.
[0135] Since according to this 14th example saturation control becomes strong, without dropping saturation on a high brightness part, without changing the brightness of the outputted picture signal as it becomes low brightness, even if it gathers the compressibility of a dynamic range, sensibility that the saturation of the low brightness section was emphasized is not produced. Moreover, since control of saturation can weaken on the whole when seldom gathering compressibility, the display of a better color picture is attained.
[0136] Furthermore, circuitry becomes simple by having used the color-difference signal. Next, the 15th example of this invention is explained. Drawing 38 is the 15th example of this invention, and is the block diagram showing the example of a configuration of a different saturation amendment circuit. This is the modification of the image processing system shown in drawing 36 .
[0137] In drawing 38 , the output C of the compression coefficient setting circuit 16 and the output Sc of the correction factor setting circuit 321 are connected to the input of a multiplier 324, respectively. The output of this multiplier 324 is connected to the input of Multipliers 325r and 325b. The outputs Cr and Cb of delay circuits 2r and 25b are connected to another input of these multipliers 325r and 325b, respectively. Furthermore, the output of Multipliers 325r and 325b is connected to the input of the matrix circuit 29.
[0138] In such a configuration, it is outputted from the matrix circuit 24 and product ScxC of the output C of the compression coefficient setting circuit 16 and the output Sc of the correction factor setting circuit 321 can take advantaging of the color-difference signals Cr and Cb which passed through delay circuits 25r and 25b. Consequently, the output of Multipliers 325r and 325b serves as ScxCxCr and ScxCxCb, respectively. Therefore, as for these, the above-mentioned (10) formula and (11) types show Cr" and that it is Cb".
[0139] The input-output behavioral characteristics of the correction factor setting circuit 321 are the same as that of the 14th example mentioned above, and since the output is the function of the increment in monotone to

the input as shown in drawing 37 , the saturation of a dark part is controlled more strongly. Moreover, since the value of Sc at the time of an input 0 is equal to the dynamic range multiplier alpha, when the compressibility of a dynamic range is high, namely, if alpha becomes small, over an input at large, Sc will also become small and, as a result, saturation control will become strong over an input at large.

[0140] Moreover, although the value of Sc at the time of an input 0 was made equal to the dynamic range multiplier alpha in this example, it is good also as a function which is proportional to alpha about this, and good also as a high order function of alpha.

[0141] Thus, since according to the 15th example saturation control becomes strong, without dropping saturation on a high brightness part, without changing the brightness of the outputted picture signal as it becomes low brightness, even if it gathers the compressibility of a dynamic range, sensibility that the saturation of the low brightness section was emphasized is not produced. Moreover, since control of saturation can weaken on the whole when seldom gathering compressibility, the display of a better color picture is attained.

[0142] Furthermore, circuitry is simplified compared with the 14th example mentioned above. Next, the 16th example of this invention is explained. Drawing 39 is the 16th example of this invention that transformed the image processing system of drawing 29 , it is the block diagram showing the example of a configuration of a different saturation amendment circuit, and although drawing 39 is almost the same as drawing 29 , the configurations of a saturation amendment circuit differ.

[0143] In drawing 39 , the saturation amendment circuit 33 consists of a delay circuit 332 with which timing with the output Sc of the saturation amendment table 331 which outputs a correction factor Sc from the output Y of a delay circuit 14, and the output Cr' of Multipliers 26r and 26b, Cb' and the saturation amendment table 331 is doubled, and multipliers 333r and 333b for multiplying output Cr' of Multipliers 26r and 26b, and Cb' by the correction factor Sc.

[0144] The luminance signal Y before being compressed is inputted into the saturation amendment table 331 in such a configuration. Through a delay circuit 332, with Multipliers 333r and 333b, each color-difference-signal Cr' and Cb' can be multiplied by the output Sc of this saturation amendment table 331, and it is outputted as Cr" and Cb".

[0145] Drawing 40 is drawing having shown the input-output behavioral characteristics of the saturation amendment table 331. As shown in this drawing, the output Sc is the function of the increment in monotone to the input. In addition, although the input-output behavioral characteristics of the saturation amendment table 331 were made into the primary function, you may make it use this for a higher order function, an exponential function, a logarithmic function, etc. in this example.

[0146] Moreover, when the dynamic range of an input is large, to the maximum of data, even the data of a smaller value exist and compressibility must be made high. On the other hand, when a dynamic range is narrow, the data below a certain value do not exist, but make compressibility low. On the other hand, it will be called a part with the small value of an input with a dark part, i.e., compression before, when compressibility is high. Therefore, if the saturation correction factor Sc is set up to the luminance signal Y before compression as shown in drawing 40 , when compressibility is high, the saturation of a dark part can be stopped.

[0147] According to this 16th example, the multiplier of saturation amendment can be determined without being based on compressibility, and amendment of accommodative saturation can be realized by easy circuitry, without preparing a complicated multiplier setting circuit etc.

[0148] Moreover, circuitry becomes easier by using a color-difference signal. Next, the 17th example is explained. Drawing 41 is the 16th example of this invention that transformed the image processing system of drawing 39 , and is the block diagram showing the example of a configuration of a different saturation amendment circuit.

[0149] In drawing 41 , the output C of the compression coefficient setting circuit 16 and the output Sc of the saturation amendment table 331 are connected to the input of a multiplier 334. The output of this multiplier 334 is connected to the input of Multipliers 335r and 335b. The outputs Cr and Cb of delay circuits 25r and 25b are connected to another input of Multipliers 335r and 335b, respectively. Moreover, the output of Multipliers 335r and 335b is inputted into the matrix circuit 29.

[0150] It is outputted from the matrix circuit 24 by the above-mentioned configuration, and product ScxC of the output C of the compression coefficient setting circuit 16 and the output Sc of the saturation amendment table 331 can take advantaging of the color-difference signals Cr and Cb which passed through delay circuits 25r and 25b. Consequently, the output of Multipliers 335r and 335b serves as ScxCxCr and ScxCxCb, respectively. As

for these, (10) types and (11) types which were mentioned above show Cr" and that it is Cb".
[0151] When the dynamic range of an input is large, to the maximum of data, even the data of a smaller value exist and compressibility must be made high. On the other hand, when a dynamic range is narrow, the data below a certain value do not exist, but make compressibility low. On the other hand, it will be called a part with the small value of an input with a dark part, i.e., compression before, when compressibility is high. Therefore, if the saturation correction factor Sc is set up to the luminance signal Y before compression as shown in drawing 40 , when compressibility is high, the saturation of a dark part can be stopped.
[0152] Since according to this example saturation control becomes strong, without dropping saturation, without changing the brightness of the outputted picture signal as compressibility becomes high when compressibility is not high, the display of a better color picture is attained.
[0153] Moreover, compared with the 16th example mentioned above, circuitry is simplified further. Next, the 18th example of this invention is explained. Drawing 42 is the block diagram showing the configuration of the 18th example of this invention that transformed the image processing system of drawing 29 . Although the configuration of the image processing system of this drawing 42 is almost the same as the equipment of drawing 29 , the configurations of a saturation amendment circuit differ.
[0154] The saturation amendment circuit 34 is constituted from the output C of the compression coefficient setting circuit 16 by the delay circuit 342 with which timing with the output Sc of the saturation amendment table 341 which outputs a correction factor Sc, and the output Cr' of Multipliers 26r and 26b, Cb' and the saturation amendment table 341 is doubled, and the multipliers 343r and 343b for multiplying output Cr' of Multipliers 26r and 26b, and Cb' by the correction factor Sc.
[0155] In such a configuration, the output C of the compression coefficient setting circuit 16 is inputted into the saturation amendment table 341. Each color-difference-signal Cr' and Cb' can be multiplied by the output Sc of the saturation amendment table 341 with Multipliers 343r and 343b through a delay circuit 342, and it is outputted as Cr" and Cb".
[0156] In the input-output behavioral characteristics of the saturation amendment table 341, as are shown in drawing 43 , the output Sc is the function of monotone reduction to input C=Y'/Y. When the dynamic range of an input is large, to the maximum of data, even the data of a smaller value exist and compressibility must be made high. At this time, compression coefficient C=Y'/Y which is the luminance signal Y before the compression in image data with a small value and the ratio of luminance-signal Y' after compression becomes a big value, and C=Y'/Y becomes a small value about image data with a big value. on the other hand, the time of a dynamic range making compressibility low narrowly -- C=Y'/Y -- an input at large -- crossing -- a small value -- ** -- it becomes. therefore, the luminance signal Y before compression and the ratio of luminance-signal Y' after compression -- if the saturation correction factor Sc is set up like drawing 15 to C=Y'/Y, when compressibility is high, the saturation of a dark part can be stopped.
[0157] In addition, in this example, although the input-output behavioral characteristics of the saturation amendment table 341 were made into the primary function, this may be used for a higher order function, an exponential function, a logarithmic function, etc. Thus, according to the 18th example, the multiplier of saturation amendment can be determined according to the compressibility of each pixel, and amendment of exact saturation can be realized.
[0158] Moreover, circuitry becomes easier by using a color-difference signal. Next, the 19th example of this invention is explained. Drawing 44 is the block diagram showing the configuration of the 19th example of this invention that transformed the image processing system of drawing 42 .
[0159] The output C of the compression coefficient setting circuit 16 is inputted into a delay circuit 344 in order to double timing with the output Sc of the saturation amendment table 341. The output C of this delay circuit 344 and the output Sc of the saturation amendment table 341 are connected to the input of a multiplier 345. And the output of a multiplier 345 is connected to the input of Multipliers 346r and 346b. The outputs Cr and Cb of delay circuits 25r and 25b are connected to another input of the above-mentioned multipliers 346r and 346b, respectively. Moreover, the output of Multipliers 346r and 346b is inputted into the matrix circuit 29.
[0160] It is outputted from the matrix circuit 24 by such configuration, and product ScxC of the output C of the compression coefficient setting circuit 16 and the output Sc of the saturation amendment table 341 can take advantaging of the color-difference signals Cr and Cb which passed through delay circuits 25r and 25b. Consequently, the output of Multipliers 26r and 26b serves as ScxCxCr and ScxCxCb, respectively, and, as for these, the above-mentioned (10) formula and (11) types show Cr" and that it is Cb".

[0161] In the input-output behavioral characteristics of the saturation amendment table 341, as are shown in drawing 43 , the output Sc has relation of monotone reduction to input C=Y'/Y. When the dynamic range of an input is large, to the maximum of data, even the data of a smaller value exist and compressibility must be made high. At this time, compression coefficient C=Y'/Y which is the luminance signal Y before the compression in image data with a small value and the ratio of luminance-signal Y' after compression becomes a big value, and C=Y'/Y becomes a small value about image data with a big value. on the other hand, the time of a dynamic range making compressibility low narrowly -- C=Y'/Y -- an input at large -- crossing -- a small value -- ** -- it becomes. therefore, the luminance signal Y before compression and the ratio of luminance-signal Y' after compression -- if the saturation correction factor Sc is set up to C=Y'/Y as shown in drawing 43 , when compressibility is high, the saturation of a dark part can be stopped.
[0162] In addition, although the input-output behavioral characteristics of the saturation amendment table 341 were made into the primary function in this example, this may be used for a higher order function, an exponential function, a logarithmic function, etc. Thus, according to the 19th example, the multiplier of saturation amendment can be determined according to the compressibility of each pixel, and amendment of exact saturation can be realized.
[0163] Moreover, compared with the 18th example mentioned above, circuitry is simplified further. Next, the 20th example which simplified circuitry further is explained with reference to drawing 45 .
[0164] Drawing 45 is the block diagram showing the configuration of the 20th example of the image processing system of this invention. This image processing system is equipped with the matrix circuit 24, the logarithmic transformation circuit 10, a filter 11, the DGC circuit 12, the inverse logarithm conversion circuit 13, the delay circuit 14, and the compression coefficient setting circuit 16.
[0165] Moreover, the saturation amendment table 351 which this equipment considers the output C of the compression coefficient setting circuit 16 as an input, and outputs the product of the saturation correction factor Sc and a compression coefficient C, The delay circuits 25r and 25b with which the timing of the output of this saturation amendment table 351 and each color-difference-signal output of the matrix circuit 24 is doubled, The multipliers 352r and 352b for multiplying the outputs Cr and Cb of delay circuits 25r and 25b by the output of the saturation amendment table 351, Output Y' of the count 13 of inverse logarithm conversion Output Cr" of Multipliers 352r and 352b, and the delay circuit 28 for doubling timing with Cb", this -- a delay circuit -- 28 -- an output -- it is -- a luminance signal -- Y -- ' -- a multiplier -- 352 -- r -- 352 -- b -- an output -- it is -- a color-difference signal -- Cr -- " -- Cb -- " -- from -- a chrominance signal -- R -- " -- G -- " -- B -- " -- outputting -- a matrix -- a circuit -- 29 -- constituting -- having -- **** . In addition, in this example, from the matrix circuit 24, since the configuration to the photography optical system 1 of the preceding paragraph - the color separation circuit 8 is the same configuration as the image processing system of drawing 28 , illustration and explanation are omitted.
[0166] In this example, the input-output behavioral characteristics of the saturation amendment table 351 are set up, as shown in drawing 46 . As for this, the output has a form of CxSc (however, Sc shall be decided by the property of drawing 43) to Input C. therefore, respectively, it becomes CbxCxSc=Cb" and the output of Multipliers 352r and 352b is the same as CrxCxSc=Cr" and the 18th example mentioned above -- a form -- **
[0167] Therefore, according to this 20th example, according to the compressibility of each pixel, the multiplier of saturation amendment can be determined by very easy circuitry, and amendment of exact saturation can be realized.
[0168] Next, the 21st example which does not use a multiplier is explained with reference to drawing 47 . Drawing 47 is the block diagram showing the configuration of the 21st example of the image processing system of this invention. In this drawing this image processing system The matrix circuit 24 and the logarithmic transformation circuit 10, The logarithmic transformation circuits 36r and 36b which carry out logarithmic transformation of the color-difference signals Cr and Cb, The filter 11 which controls the low-frequency component of the luminance signal logY by which logarithmic transformation was carried out, The DGC circuit 12 and the delay circuit 14 for doubling timing with output logY' of the DGC circuit 12 for the output logY of the logarithmic transformation circuit 10, It has the output logY of a delay circuit 14, and the difference of output logY' of the DGC circuit 12 and the compression coefficient setting circuit 37 which outputs logY-logY'=log(Y'/Y) =logC.
[0169] Moreover, the saturation amendment table 353 on which this equipment outputs the multiplier which applied the saturation correction factor to the output logC of the compression coefficient setting circuit 37, The

delay circuits 25r and 25b for doubling timing with the output of the above-mentioned saturation amendment table 353 for the output of the logarithmic transformation circuits 36r and 36b, It has the adders 354r and 354b for applying the output of the saturation amendment table 353 to the output of delay circuits 25r and 25b, and the inverse logarithm conversion circuits 38r and 38b which carry out inverse logarithm conversion of the output of Adders 354r and 354b.

[0170] Furthermore, the delay circuit 28 for this equipment to double timing with the output of the above-mentioned adders 354r and 354b for output logY' of the above-mentioned DGC circuit 12, an inverse logarithm -- a conversion circuit -- 13 -- this -- an inverse logarithm -- a conversion circuit -- 13 -- an output -- it is -- a luminance signal -- Y -- ' -- an inverse logarithm -- a conversion circuit -- 38 -- r -- 38 -- b -- an output -- it is -- a color-difference signal -- Cr -- " -- Cb -- " -- from -- a chrominance signal -- R -- " -- G -- " -- B -- " -- outputting -- a matrix -- a circuit -- 29 -- having had -- a configuration -- becoming -- **** .

[0171] said -- an example -- **** -- a compression coefficient -- a logarithm -- a form (logC) -- outputting -- having -- a sake -- saturation -- amendment -- a table -- 353 -- an output -- a logarithm -- a form (log (CxSc)) -- ** -- carrying out -- this -- an adder -- 354 -- r -- 354 -- b -- a logarithm -- a form -- a color-difference signal -- adding -- an inverse logarithm -- a conversion circuit -- 38 -- r -- 38 -- b -- an inverse logarithm -- conversion -- carrying out -- things -- saturation -- amendment -- carrying out -- having had -- a color-difference signal -- Cr -- " -- Cb -- " -- obtaining -- having . Moreover, since a logarithmic transformation circuit and an inverse logarithm conversion circuit can be easily constituted from memory, such as ROM and RAM, and it can constitute, without using a multiplier further, circuitry becomes simple.

[0172] Thus, according to the 21st example, according to the compressibility of each pixel, the multiplier of saturation amendment can be determined by very easy circuitry, and amendment of exact saturation can be realized.

[0173] In addition, the image processing system of this invention is not limited to the example mentioned above. It cannot be overemphasized that each example is applied to all things including the outline of this invention also about combination or the changed thing.

[0174]

[Effect of the Invention] As mentioned above, according to this invention, since it was made a configuration which amends saturation accommodative using the information acquired from image data, in case the dynamic range of a color picture is compressed, even if compressibility changes variously, it can display good in a color tone with data to natural data with high brightness with low brightness.

[Translation done.]

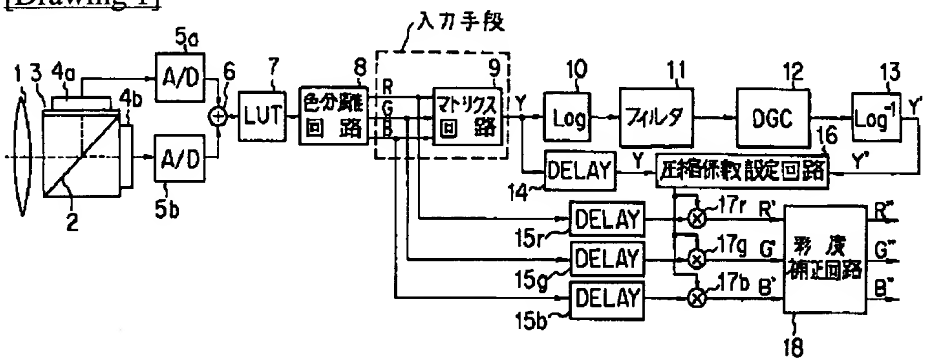
* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

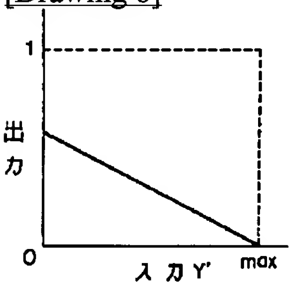
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

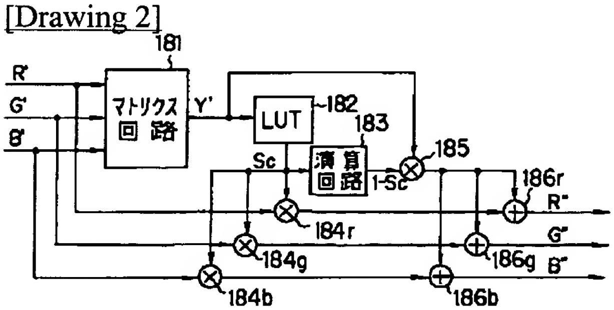
[Drawing 1]



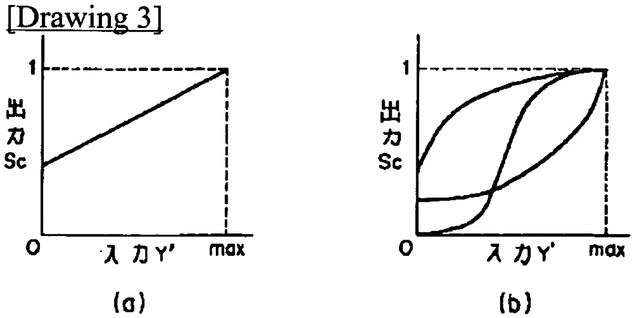
[Drawing 6]



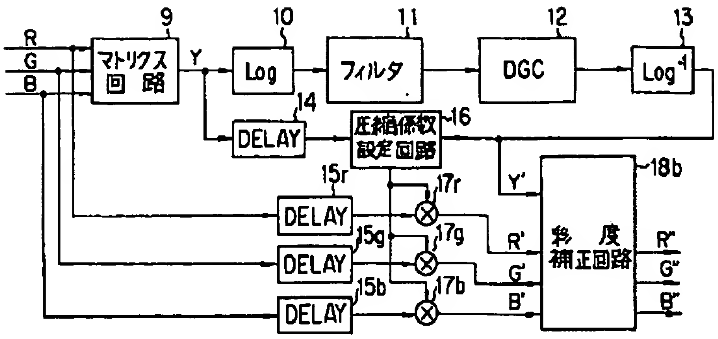
[Drawing 2]



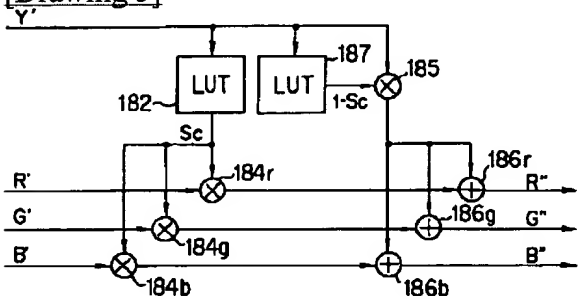
[Drawing 3]



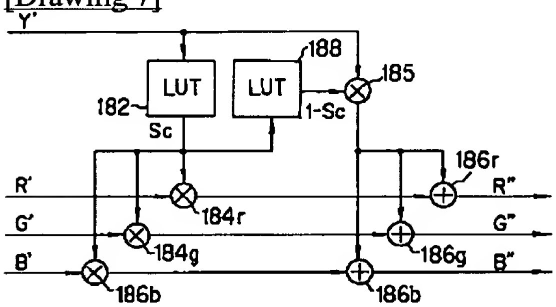
[Drawing 4]



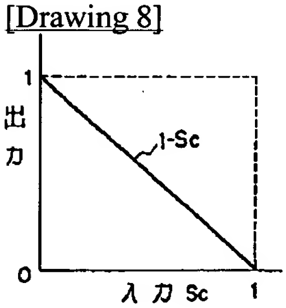
[Drawing 5]



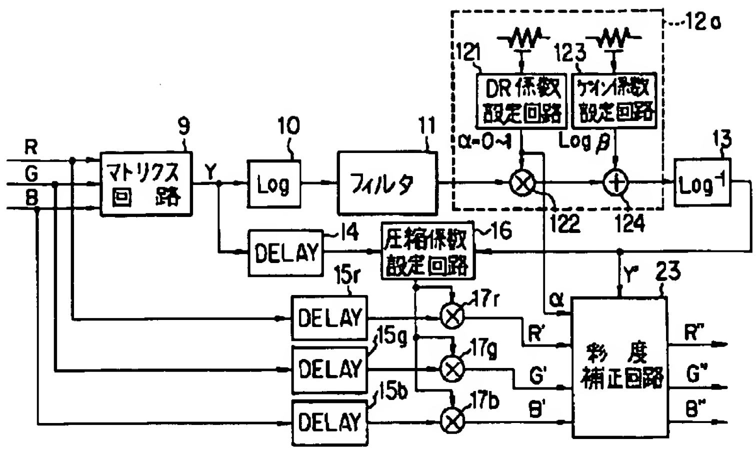
[Drawing 7]



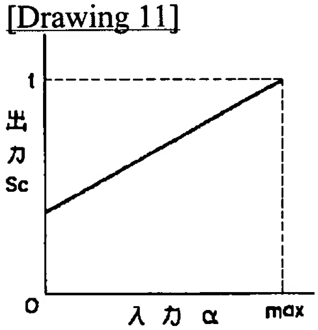
[Drawing 8]



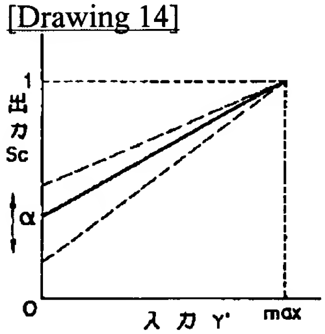
[Drawing 9]



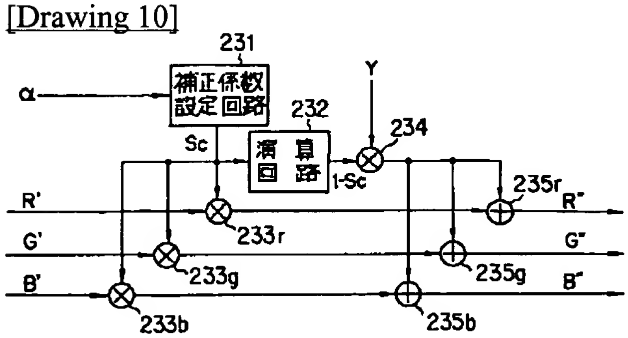
[Drawing 11]



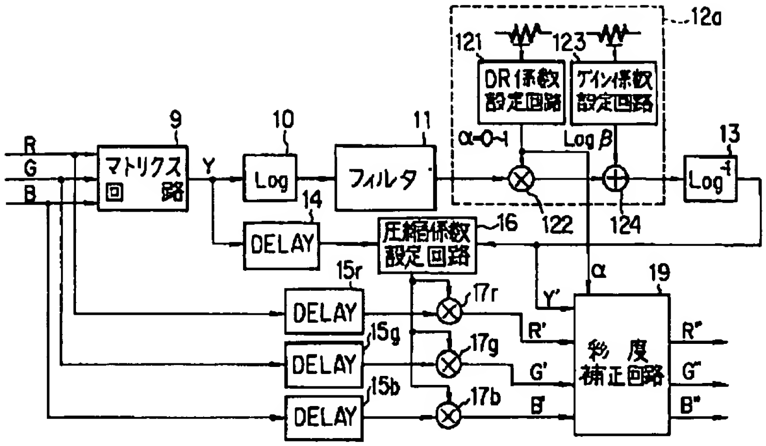
[Drawing 14]



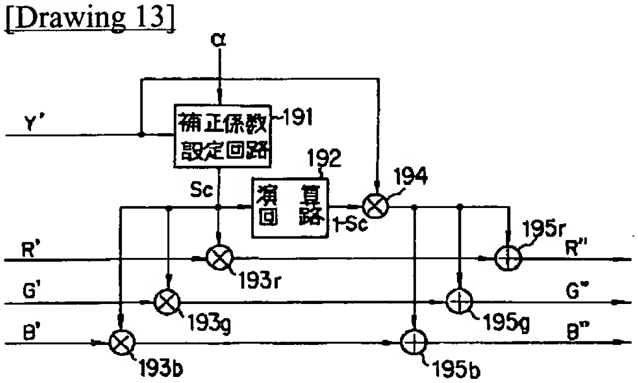
[Drawing 10]



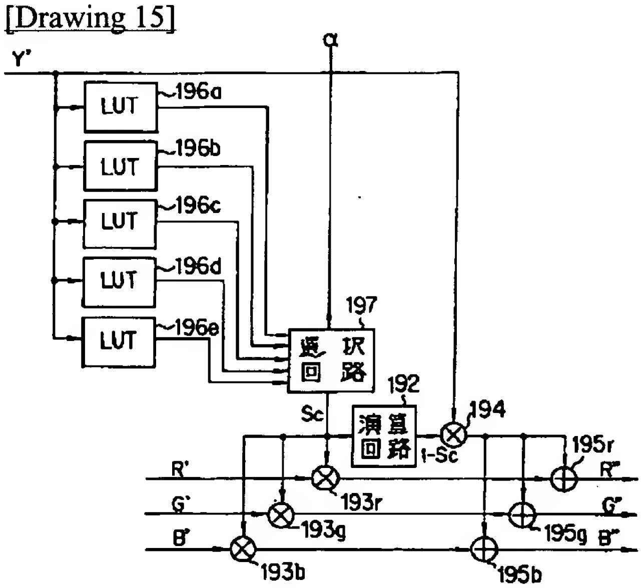
[Drawing 12]



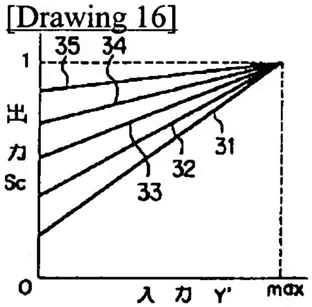
[Drawing 13]



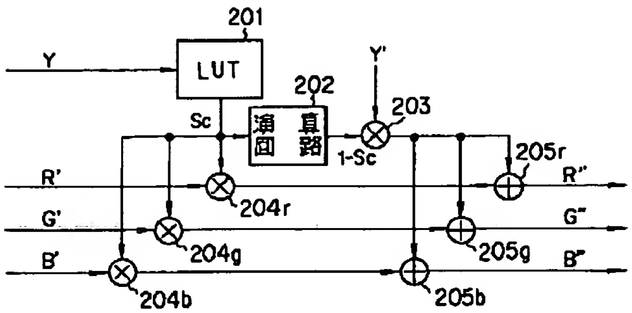
[Drawing 15]



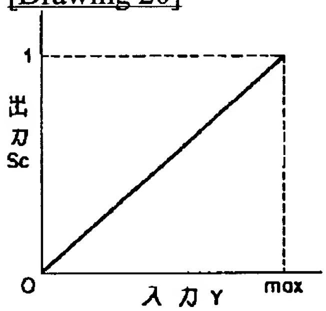
[Drawing 16]



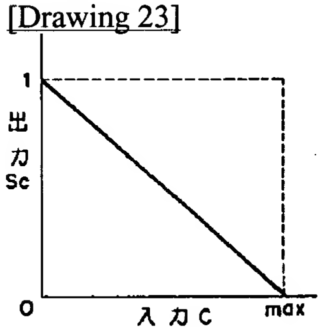
[Drawing 19]



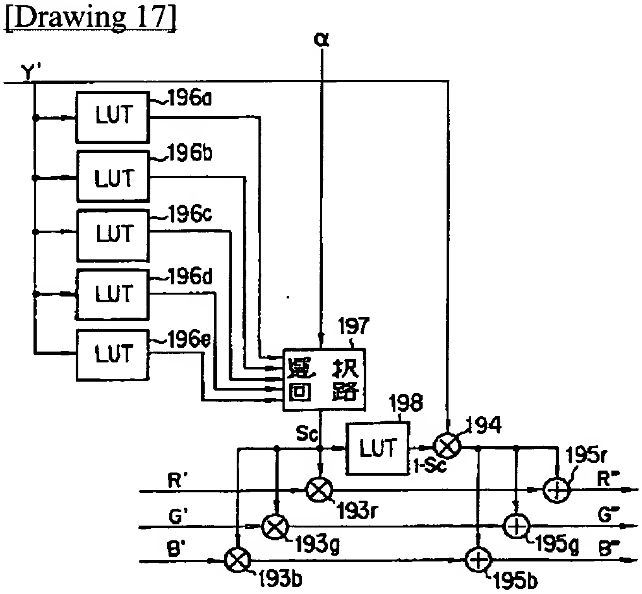
[Drawing 20]



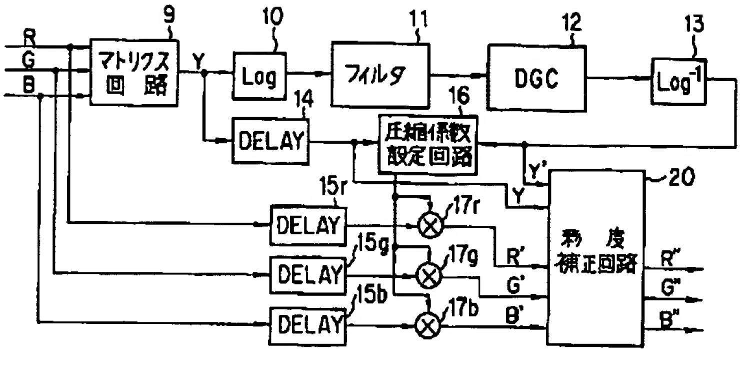
[Drawing 23]



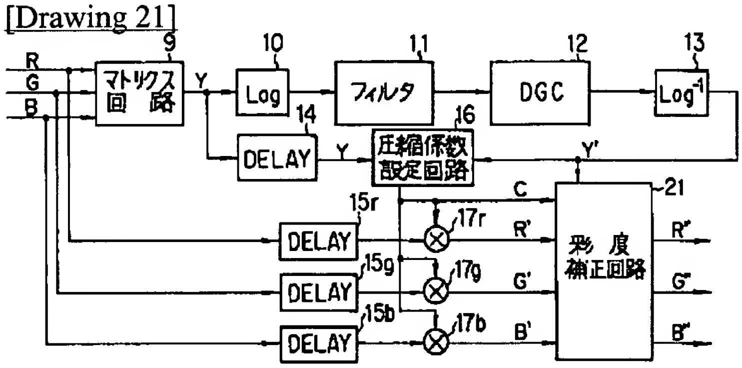
[Drawing 17]



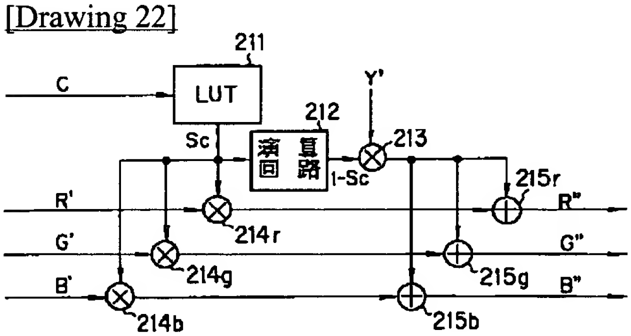
[Drawing 18]



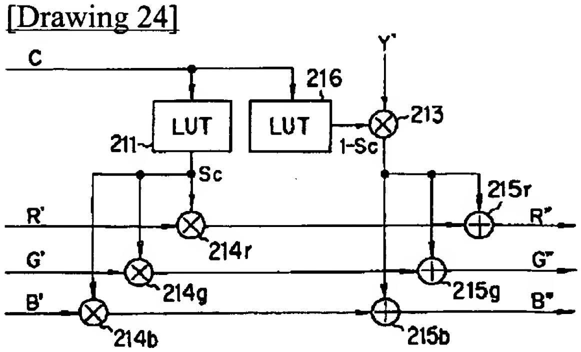
[Drawing 21]



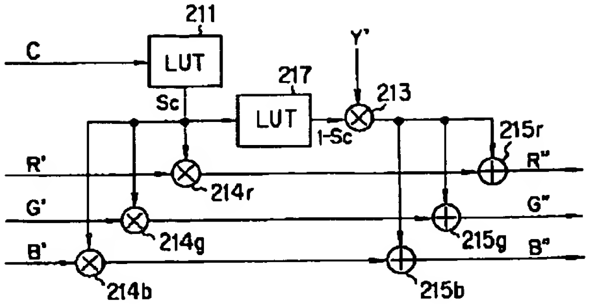
[Drawing 22]



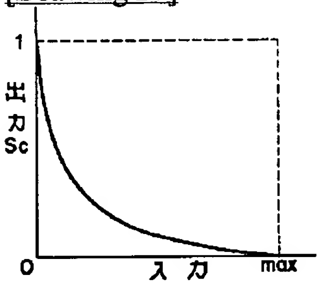
[Drawing 24]



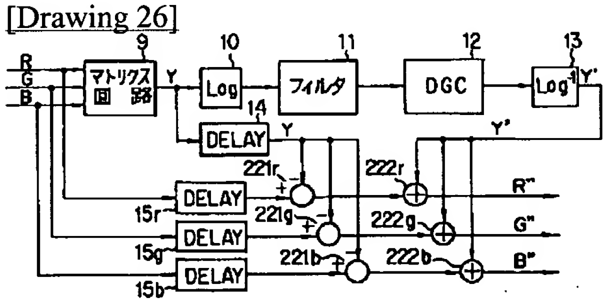
[Drawing 25]



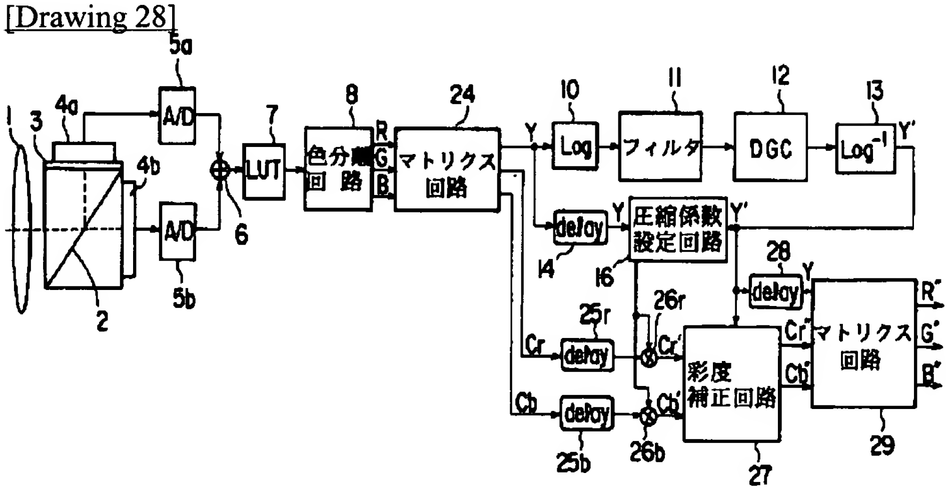
[Drawing 27]



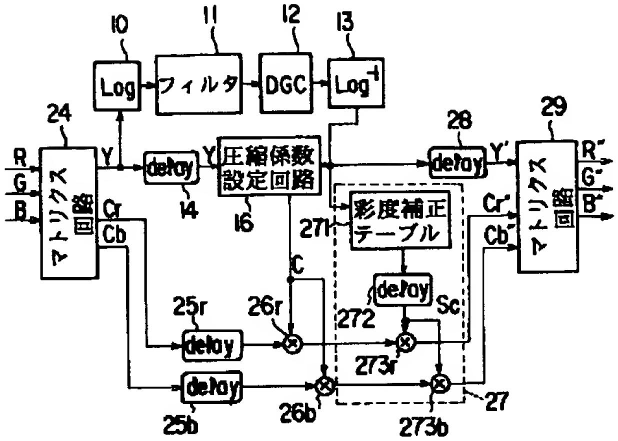
[Drawing 26]



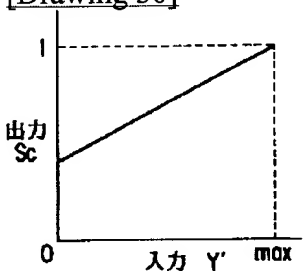
[Drawing 28]



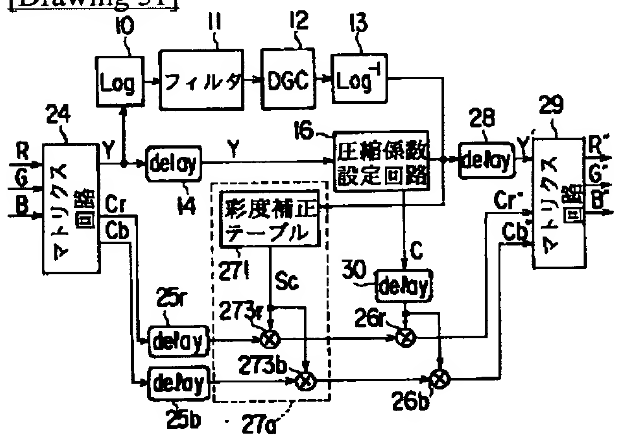
[Drawing 29]



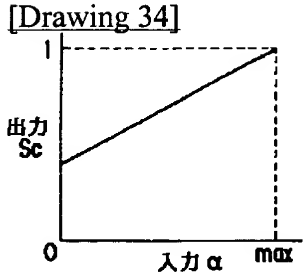
[Drawing 30]



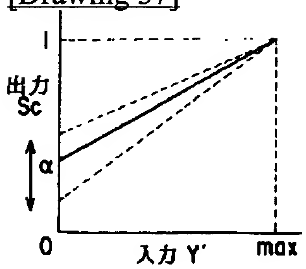
[Drawing 31]



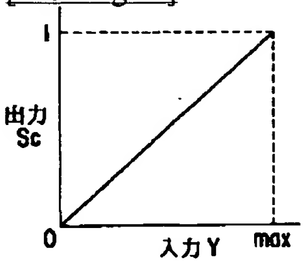
[Drawing 34]



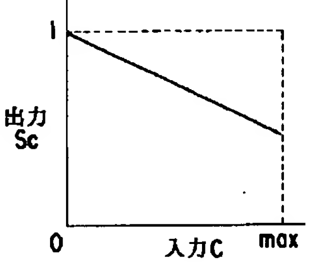
[Drawing 37]



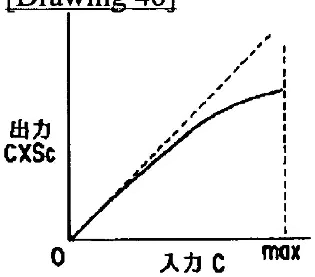
[Drawing 40]



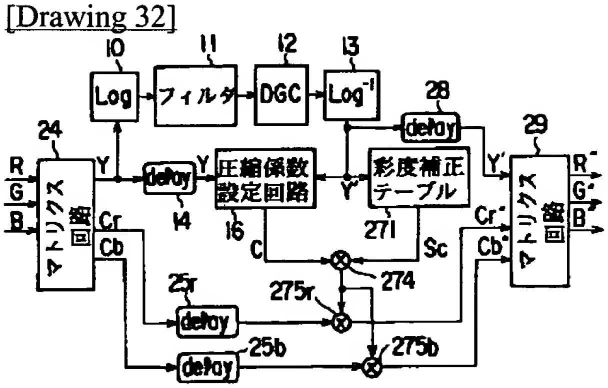
[Drawing 43]



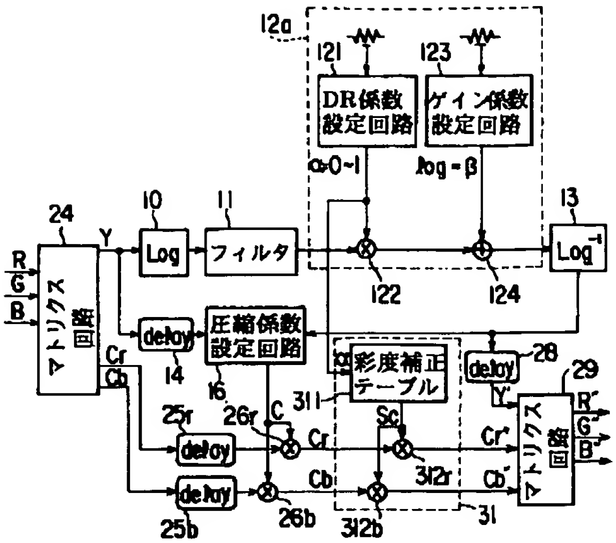
[Drawing 46]



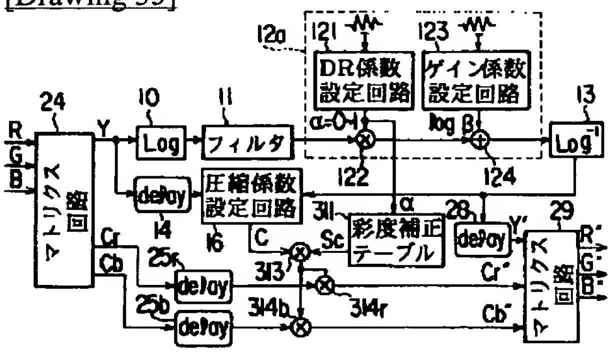
[Drawing 32]



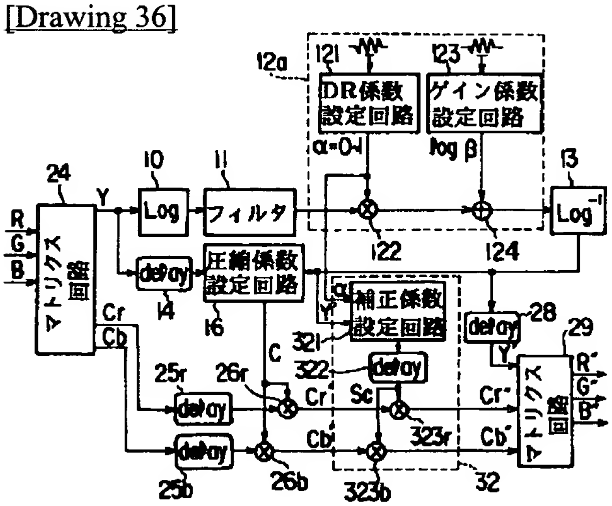
[Drawing 33]



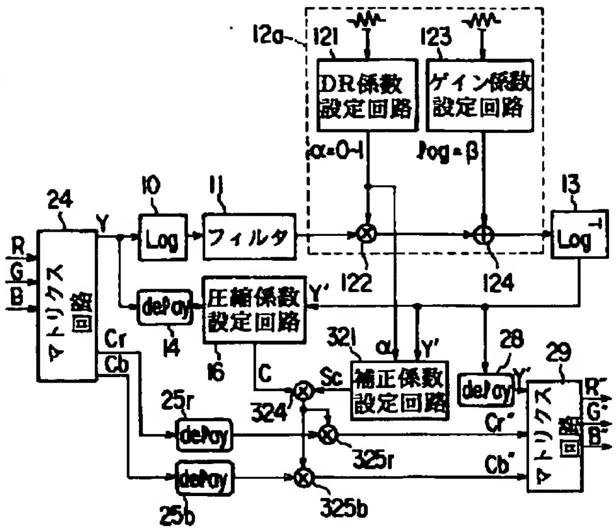
[Drawing 35]



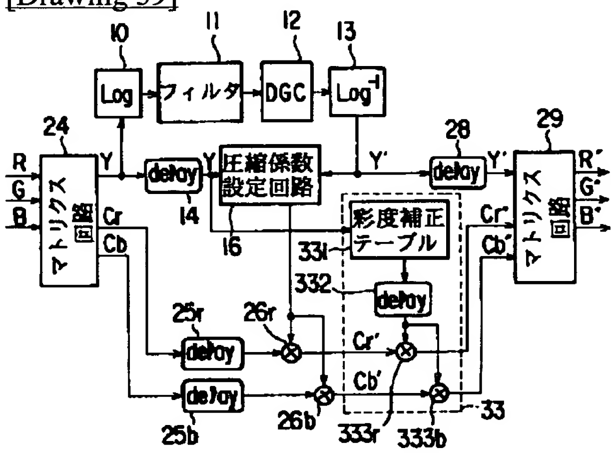
[Drawing 36]



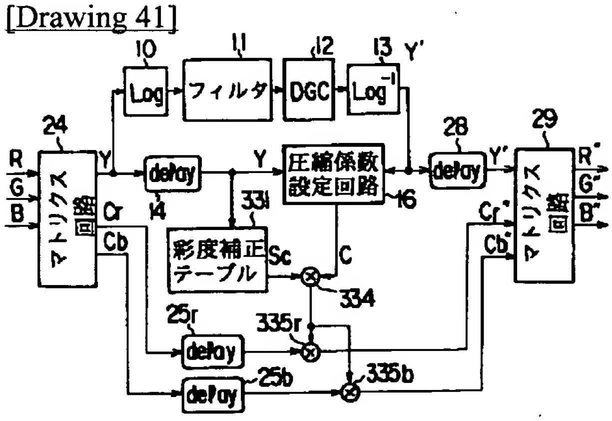
[Drawing 38]



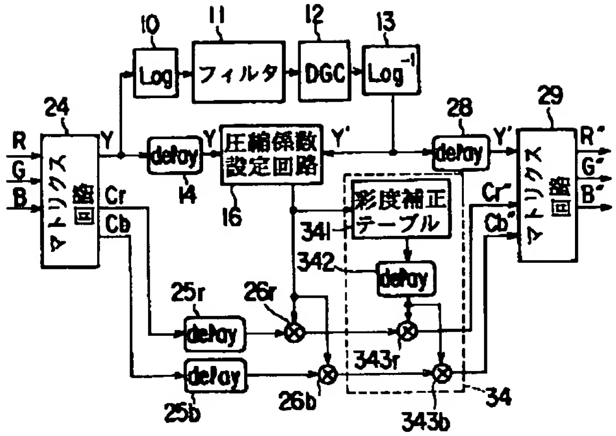
[Drawing 39]



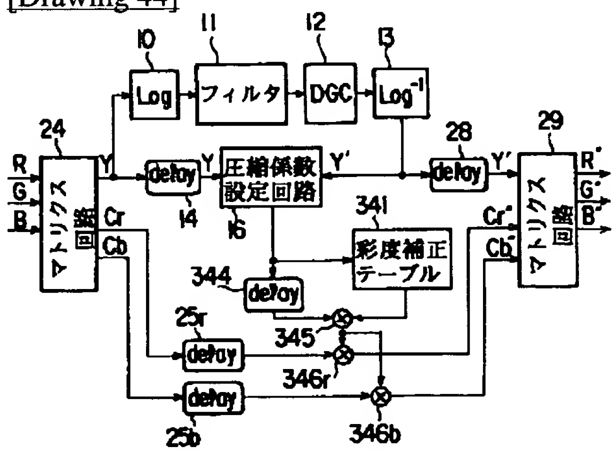
[Drawing 41]



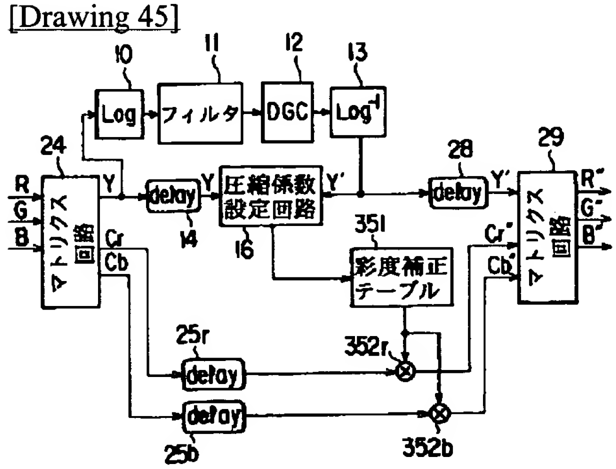
[Drawing 42]



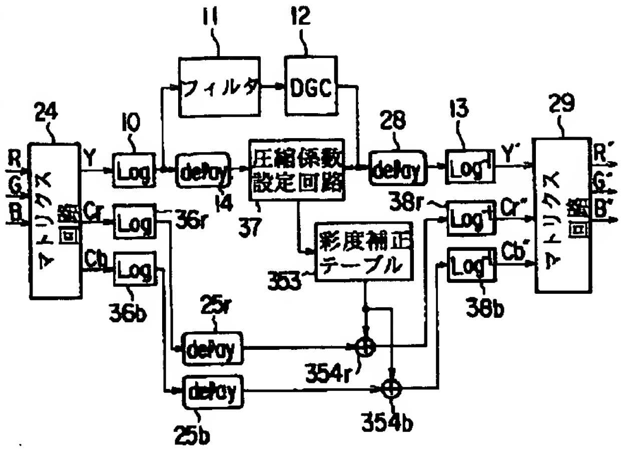
[Drawing 44]



[Drawing 45]



[Drawing 47]



[Translation done.]